

European Security & Defence

€ 8.90
D 14974 E



3/2020

International Security and Defence Journal

Individual Firepower

- Frontex
- Spanish Navy
- Turkey's Elite Police Unit
- Special Operations Vehicles
- Night Vision Technology
- Detecting Explosives
- Offshore Patrol Vessels
- Spanish Defence Industry



NIMR

PROVEN
TACTICAL
MOBILITY.

AJBAN 447A

4x4 Multi-Role Armoured Vehicle



The AJBAN 447A Multi-Role Armoured Vehicle is designed for use in a wide range of specialist military roles, offering high levels of survivability, mobility and firepower. The 447A is a forward-facing seven crew (5+2) military tactical vehicle featuring a highly configurable armoured cabin designed for use by different units such as Tactical Response, Border Patrol, Reconnaissance, Counter-Insurgency and Special Forces teams. The vehicle offers a modular design, featuring scaleable levels of ballistic, mine blast and IED protection based on a conventional powertrain layout.

Discover more at
nimr.ae



Western Cohesion



Since its beginnings, in the early 1960s, the Munich Security Conference has been regarded as a seismograph for the most urgent security policy problems at any given time. More recently, the guest appearance of Vladimir Putin in 2007 was particularly memorable, as many people still believed that a strategic security partnership between the Western nations and Russia was not only desirable but also possible. After Putin's speech, this illusion was shattered.

One regrettable conclusion to be drawn year after year is, that although new security crises and fundamental problems are added to the agenda at every new conference, those that were hotly debated at previous events were neither resolved nor even brought closer to resolution. This is not a remark "against" the conference. Rather, it speaks for the necessity of conferences like Munich. Above all, however, it is a depressing sign of the ever-increasing instability of the international order. The northern hemisphere states still manage to shield their citizens from this instability: how long this tour de force can be sustained is written in the stars.

The problem to which this year's participants and public observers attempted to draw attention was initially referred to as "Westlessness". It soon became apparent that this neologism met with little understanding beyond German ears, but the phenomenon was profound, and serious. In the words of the conference chairman, Ambassador Wolfgang Ischinger, "We have lost a common understanding of what it means to belong to the Western world (...). All this is happening against the background of the relative rise of the non-Western world and an increasing number of challenges and crises that require a concerted response from the West."

However, the viewpoint from which this depressing assessment was made is typically European: the American view of things is different. In recent decades, from Vietnam to Iraq, the United States may have miscalculated, made repeated misjudgements, pursued half-baked strategies and even suffered downright defeats, but this has not shaken its belief that, as with the 20th century, the 21st will again be American - and perhaps rightly so. "The best is yet to come," Donald Trump now promises in his 2020 pre-election campaign. No one should dismiss this as a cheap slogan. We can still philosophise about the multipolarity of a new world order, but when it really comes down to it, when it is not just a matter of making a clever move in the geopolitical game, when the fundamental interests of the United States are threatened, they will still be able to impose their will on any adversary, wherever he or she may be. The acknowledged economic, demographic, technological, intellectual and military superiority of the United States keeps all challengers at a distance.

When its lead nation is bursting with strength and self-confidence, the West as a whole cannot be too badly off. The depression felt by Europeans is primarily a discomfort in their own performance. They fear that they have reached an impasse with the European Union and that major course corrections will be necessary to prevent other Member States from following the British example. They sulk when they realise that all their efforts to "civilise" and pacify local trouble spots in the south, the south-east and the east of Europe are failing. Beyond appeals to "reason", "humanity" and "universal principles", too little diplomatic or military weight is being brought to bear – or, indeed, is available.

However, we must not attach too much importance to European sensibility. Fin-de-siècle prophecies arise repeatedly in Europe, especially over the last 150 years, but if we consider all these fantasies of doom en bloc, it is clear that the continent has held its own quite well, globally. And perhaps, from time to time we should look outwards at daily political and military reality. While the VIPs debated at the Munich Security Conference, DEFENDER-Europe 2020 was underway. The largest exercise in 25 years for the transfer of significant military reinforcements from the USA to Eastern Europe, this, far more than conferences, underlines the transatlantic cohesion of the West.

Peter Bossdorf

Special Operations Ground Vehicles

Photo: ARQUUS



Increasing demand for more sophisticated and varied solutions

Page 58

Detecting Explosives

Photo: FLIR



Science, technological innovation and solutions

Page 80

■ SECURITY POLICY

- 12 **Frontex Ready to Meet New Challenges**
Michał Jarocki
- 16 **"The EU's external borders are only as strong as their weakest link."**
Interview with Izabella Cooper, Frontex Spokeswoman
- 22 **Military Cooperation between Israel, Greece and Cyprus**
Eugene Kogan
- 28 **How Much Has Russia Militarised the Crimea?**
Georg Mader
- 32 **CBRN Hazards to the Natural Environment**
Dan Kaszeta

■ ARMED FORCES

- 36 **"The international strategic scenario is complex and uncertain."**
Interview with Admiral Teodoro Lopez Calderón, Chief of the Spanish Navy
- 40 **Peace on the Spectrum**
Electronic Warfare – a Game Changer?
Thomas Withington
- 46 **Turkey's Elite Police Unit**
Korhan Özkilinc
- 51 **Moral Decision-Making Training in the Military**
Chloe Brennan
- 54 **The Bangladesh Navy – An Available, Adaptive and Affordable Force**
Interview with Rear Admiral Mohammad Musa, Commander Khulna Naval Area (COMKHUL)

■ ARMAMENT & TECHNOLOGY

- 58 **Special Operations Ground Vehicles**
Sidney E. Dean

- 66 **Improved Individual Firepower**
Jan-Phillipp Weisswange
- 72 **Pointing the Way in Europe's GOSSRA Project**
Erik Wimmer
- 74 **No Place to Hide in the Dark**
Tim Guest
- 78 **Equipment in Riot Control**
Tim Guest
- 80 **Detecting Explosives**
Tim Guest
- 87 **Renaissance of the Mortar**
Christopher F. Foss
- 88 **Inner Layer Defence Systems**
New Developments Against Anti-Ship Cruise Missiles and Asymmetric Threats
Luca Peruzzi

■ INDUSTRY AND MARKETS

- 94 **Spanish Defence Industry**
Esteban Villarejo
- 100 **"We offer a mature modular turret system for the Spanish 8x8 vehicle programme."**
Interview with Mark Fenwick, General Manager, John Cockerill Defense España
- 101 **Offshore Patrol Vessels**
Market Development & Programmes
Conrad Waters
- 107 **Anti-Ship Missiles**
Market Outlook and Programme Review
Bob Nugent
- 112 **"The Armed BLACK HAWK is well-suited for militaries that may not want to field a dedicated attack helicopter."**
Interview with John Lopes, International Director for Latin America and the Caribbean at Lockheed Martin, and Adam Schierholz, Vice President & Regional Sales Executive – Latin America at Sikorsky Aircraft
- 116 **DefExpo 2020 – A Wrap-Up**
Suman Sharma

VIEWPOINT FROM ...

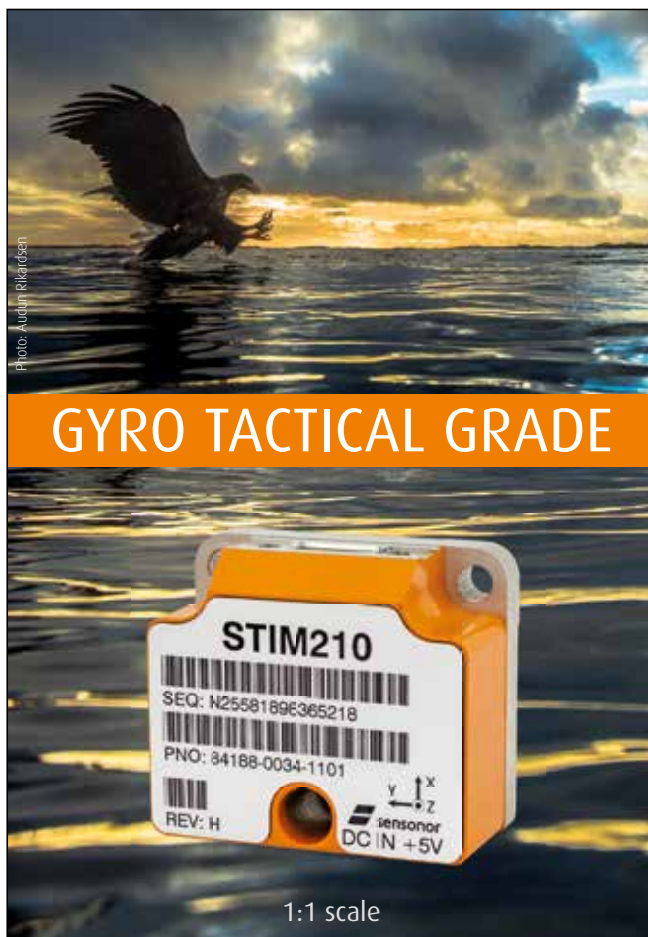
- 21 **Dublin**
Tommy Martin
- 26 **Hamburg**
Ludolf Baron von Löwenstern
- 31 **Edinburgh**
John Cooke
- 45 **Paris**
David Saw

COLUMNS

- 1 **Editorial**
- 6 **Periscope**
- 39 **Masthead**
- 118 **Firms & Faces**
- 120 **Preview Issue 4/2020**

Index of Advertisers

AAD	79
Arms & Security	29
ATM ComputerSysteme	11
Aviasvit	85
Balt Military Expo	19
Barzan Holding	3 rd cover
BRENSAN	47
BSDA	111
Ceska zbrojovka a.s. (CZ)	4-5
Eurofighter Jagdflugzeuge	41
Eurosatory	61
EWE	43
Future Forces	49
General Dynamics European Land Systems	97
HEMUS	15
IDEAS	71
ITEC	83
John Cockerill	95
Koehler Books	115
Lequian	99
Lockheed Martin	4 th cover
Lürssen	102-103
Navy League	119
Nexter	17
NIMR	2 nd cover
Sensoror	3
VECTED	75
Xponential	91



STIM210 is a small, lightweight Three Axis Gyro Module for accurate pointing and stabilization, flight control and guidance applications.

- ITAR free
- Small size, low weight, power and cost
- Insensitive to magnetic fields
- Low gyro bias instability (0.3°/h)
- Low gyro noise (0.15°/√h)
- Excellent performance under vibration and shock
- Available in 1, 2 or 3 axes
- Fully calibrated and customer configurable to the specific application
- Weight 55 grams, volume <2cu.in, power 1.5 W

STIM210 is field proven in **Missile systems, Target acquisition systems, Airborne surveillance, DIRCM, Remote Weapon Systems, Launch vehicles, Military Land navigators and Satellites.**



When size, performance and robustness matter

sales@sensoror.com • sensoror.com

CZ MILITARY PROGRAM

CZ P-10 M

9×19



PISTOLS

CZ P-10 SERIES

- Comprehensive family of striker-fired pistols
- Developed in close cooperation with elite military and police units
- Extreme reliability, high accuracy, and exceptional resistance to any type of damage
- Excellent ergonomics with option for some individual modifications of grip size (except for P-10 M)
- Availability includes Optics Ready design (version CZ P-10 C OR)

CZ P-10 S

9×19



CZ P-10 C

9×19



CZ P-10 SC

9×19



CZ P-10 F

9×19



SUBMACHINE GUNS

- Developed specifically for the needs of today's armed forces in close cooperation with elite task force personnel
- Proprietary system of action deposition
- Utilization of extremely durable polymers and other hi-tech materials a technology
- Superb ergonomics, high accuracy in all modes of fire
- Absolute reliability regardless of climatic conditions anywhere in the world
- Unrivalled easy and quick basic disassembly



CZ SCORPION EVO 3 A1

9×19, 9×21



CZ

For those
who know



CZ ASSAULT AND BATTLE RIFLES

- A multi-calibre assault rifle designed to satisfy the most demanding users from the ranks of special units and armed forces operating anywhere in the world
- A battle-proven weapon serving in NATO and EU missions and operations
- Extreme reliability and durability of the weapon in all conditions
- High accuracy and long service life
- Low weight and compact dimensions for quick and comfortable handling
- Ambidextrous controls
- Elaborated ergonomics with excellent shooting characteristics



CZ **BREN 2**

5,56×45 NATO

8" / 11" / 14"



CZ **BREN 2**

7,62×39

9" / 11" / 14"

CZ **BREN 2 BR**

7,62×51 NATO

16"



■ Major Milestones in LAND 121 Phase 3B Programme

(df) Australia has declared Initial Operating Capability (IOC) status for the LAND 121 Phase 3B programme after more than 2,500 Rheinmetall MAN high mobility logistics vehicles were delivered and proven their capabilities during Exercise Talisman



Photo: Rheinmetall

Sabre in 2019. The Land 121 Phase 3B contract commenced in April 2016 with a four-year programme focused on the delivery of a fleet of 2,536 vehicles in multiple configurations to form the logistics backbone of the Australian Defence Force. Deliveries to Australian Army facilities around Australia are expected to be completed by April 2020 under the Land 121 Phase 3B programme schedule. The following variants are included in this contract: Heavy Integrated Load Handling (HX-77); Heavy Tipper (HX-77); Medium Tipper (40-M); Tractor (HX-81); Heavy Recovery (45M); Medium-weight Tray with Crane (40M); and a Medium-weight Tray (40M).

■ UK Invests £2.3Bn in BOXER Programme

(df) The UK MoD has awarded a £2.3Bn contract for the BOXER Mechanised Infantry Vehicle (MIV) programme. A significant portion of the manufacture of the 500 BOXER Armoured Vehicles for the Army's Strike Brigades will take place at KMW's UK subsidiary, WFEL. Delivery of the vehicles is expected to start from 2023. This order marks the return of the UK to a European Defence Programme, having taken part in the BOXER project while in its infancy. With the UK as another customer – other users are Germany, The Netherlands, Lithuania and Australia –



Photo: WFEL

BOXER is now on its way to becoming one of Europe's standard vehicles. The British BOXER MIV programme aims to source more than 60% by value of the vehicle content from UK suppliers and these 8x8 wheeled vehicles will be supplied in several different configurations, including an armoured personnel carrier, field ambulance, command vehicle and specialist carrier. "Investing in the BOXER programme is a prime example of defence doing more than ever to level-up the UK economy through employment. By developing our relationship with WFEL, we are also supporting high-skilled jobs across the UK supply chain," said British Minister for the Armed Forces, James Heapey. "This partnership ensures we engage with our people from the very beginning, connecting talented apprentices with the valuable roles defence has to offer."

■ GECKO Boats for the German Navy

(gh) The German Navy will receive 22 GECKOs. These powerful and flexible boats will be used for rescue and transportation. They can be adapted according to their role. If, for example, more space is required for transporting materials, six of the eight seats can be removed: the flexibility comes from the GECKO's rail system. Another twelve



Photo: Zodiac Milpro

GECKOs for the K 130 corvette are also under contract. Users of the boats will be seagoing units and training organisations. The equipment is the same for all users, which reduces the current variety of products considerably and saves on procurement costs, as well as supply and logistics in the future. This standardisation has two further advantages: on the one hand, fewer trials and tests of different units or new boats will have to be carried out in future whilst on the other hand, training effort is reduced, as personnel in different units of the German Navy will be able to operate with the same equipment. An independent project, which runs in parallel to the contract for the new boats, is the redesign of their launching gear (ASV) on the class 404 support ships. The new ASV will initially be installed on the ELBE support ship, which is due to leave the shipyard in spring. The other five 404s will

be fitted with it in the coming shipyard lay days. In order to benefit from the advantages of reducing the variety of products, this system will also be installed on the class 130 corvettes 2nd batch.

■ Four H160 for the French Navy

(gh) In a partnership with Airbus Helicopters, Babcock and Safran Helicopter Engines, the French procurement agency DGA is providing the French Navy with four H160



Photo: Airbus

helicopters for search and rescue (SAR) missions. The helicopters will bridge the gap between the withdrawal of ALOUETTE III and the entry into service of H160M GUÉPARD from 2026 for a period of ten years from 2022. The maiden flight of the H160M is planned for 2023. The civil version, the H160, will be launched later this year. H160 is a next-generation twin-engine helicopter in the 6-tonne class and is powered by two SAFRAN ARRANO engines (738 kW continuous power each). The modular concept allows mission-specific equipment, for example offshore transport, private and business aviation, emergency medical services and public services. The H160M GUÉPARD military version, which is also modular, will be delivered from 2026 in a total of 169 aircraft. It is to replace five helicopter types (Army: GAZELLE; Navy: ALOUETTE III, DAUPHIN and PANTHER; Air Force: FENNEC) in the French armed forces as part of the joint light helicopter programme (Hélicoptère Interarmées Léger, HIL). For the Army, 80 helicopters are planned from 2026, for the Navy, 49 from 2028 and for the Air Force, 40 aircraft. The range of roles in the Army includes armed reconnaissance, fire support, special forces and medical evacuation. The Navy intends to use the helicopter for anti-ship, reconnaissance and sea rescue missions. Air Force roles include airspace protection, SAR and reconnaissance.

■ Patria Delivers First Upgraded HAMINA Missile Boat

(mj) Finland's MoD has confirmed completion of the first of four HAMINA class missile boat mid-life upgrades (MLU). The HAMINA



Photo: Patria

class upgrade programme, which started in early 2018, adding new anti-submarine warfare (ASW) and surface defence capabilities, should reach completion in 2021. Prime contractor Patria's business unit Systems delivered the TORNIO to the Finnish Navy during a ceremony held at the Upinniemi naval base after starting work on the MLU almost two years earlier – and almost two decades after its original delivery from the Aker Finnyards (later STX Finland, then Meyer Werft, USC). Patria handed over the vessel after completing a rigorous regimen of naval tests and trials in 2019 to prove the vessel's operational capabilities and the MLU's effectiveness. Subcontractors on the MLU include Teijo Finland-based Oy Western Shipyard Limited. While Patria Systems is responsible for integration of a number of sensor, weapon and communication systems, system upgrades, etc. each of the HAMINA class missile boats will also receive the following from selected subcontractors that Patria System integrates as prime contractor: the ASW training target system (Patria), the Bofors 40 Mk4 40mm Main Naval Gun (BAE Weapon Systems Sweden), Torpedo 47 (Saab Business Area Dynamics), the TRACKFIRE Remote Weapon Stations (Saab Business Area Dynamics), the Saab 9LV Combat Management System (Saab Business Area Surveillance), the GABRIEL V Anti-Ship Missile (IAI / Israel Aerospace Industries Ltd.), the ST2400 Variable Depth Sonar (Kongsberg Maritime); the CEROS 200 radar and optronic tracking fire control director – updated (Saab Business Area Surveillance), and the TRS-3D phased array C-band radar – updated (Hensoldt). The Patria-led MLU will extend the service life of HAMINA class missile boats until 2030, when the next generation POHJANMAA class corvettes enter service. The POHJANMAA class acquisition is part of the Squadron-2020 programme.

■ New Sniper Rifles

(ck) Accuracy International Ltd (AI), a manufacturer of sniper rifles with headquarters in Portsmouth, Hampshire, UK, has launched two new models, the AX MKIII and AX 50 ELR. The AX MKIII is the latest combat proven sniper rifle from AI and has been designed to meet current operational needs. Tested

to current NATO requirements for military sniper rifles, it has evolved from the AXMC multi-calibre rifle and is a variant of the AX-SR, produced for the US Market, and shares many features. The rifle is configured in .338 Lapua Magnum and has multi-calibre conversion kits that are user-configurable and mission-adaptable. The AX MkIII features an integral Arca-Swiss Style tripod mounting rail under the forend tube and forend grip, barricade supports, and AI's patented Quickloc barrel system bolted to the aluminium chassis. Improved design features include the bolt, lock ring, an ambidextrous position safety catch and rubber AR style changeable pistol grip. The well proven and



Photo: Accuracy International

reliable AI detachable magazine is included in 10 round, double stack, CIP length for all calibres, without the need for a magazine adapter. The AX 50 ELR long-range anti-materiel rifle is also a multicalibre rifle system. The rifle as supplied is configured in .50 BMG and can be converted to .408 Cheytac or .375 Cheytac. Features include an Arca-Swiss Style tripod mounting rail under forend grip, barricade supports, the Quickloc barrel system and 10 round double stack magazines.

■ Four More H145s for the UK

(ck) Airbus Helicopters in the UK is to provide four additional H145 helicopters as part of an expansion of the UK Military Flight Train-



Photo: Airbus Helicopters

ing System (UKMFTS). The new helicopters will join the existing fleet of 29 H135s and three H145s, known respectively as JUNO and JUPITER in MFTS service. They will be delivered during 2020. Operated by Ascent Flight Training Management Ltd primarily from RAF Shawbury as well as RAF Valley on behalf of the MoD, the aircraft are used to train all UK military helicopter pilots and rear crew. Airbus Helicopters is fully embedded at both bases as the rotary wing aircraft service provider to Ascent. Colin James, Managing Director of Airbus Helicopters in

the UK, said: "The H135 JUNO and H145 JUPITER are demonstrating, day-in and day-out, their exceptional reliability and versatility in the training role at UKMFTS. It's deeply satisfying for us to see the first aircrew having already graduated and we look forward to delivering the additional aircraft in the very near future." The H145 helicopter family has completed more than 5.5 million flight hours worldwide with more than 1,300 aircraft in the global fleet.

■ EO/IR Sensors for Indian UAVs

(ck) India's Defence Research and Development Organisation (DRDO) has contracted CONTROP Precision Technologies Ltd, a company specialising in electro-optics and infrared (EO/IR) for defence and homeland security solutions, for the supply of its iSky-50HD systems, for use on unmanned air platforms. The systems will be used on unmanned air platforms currently being developed for the Indian Armed Forces. The iSky-50HD is a member of CONTROP's iSky family of lightweight, compact EO/IR observation systems, which have been specifically designed for use in challenging airborne environments. The iSky-50HD features sensitive multi-spectral sensors, which are gyro-stabilized and have advanced image processing algorithms, thereby providing maximum sensor ranges and performance for a variety of airborne defence applications. In daily operation around the world since the 1990s, the iSky systems are integrated into a wide variety of UAV, helicopter, fixed-wing aircraft and aerostat platforms.



Photo: CONTROP

■ New Pakistani Offshore Patrol Vessel Commissioned

(ck) The Pakistan Navy has commissioned the 2,300 tonnes Corvette PNS YARMOOK (F-271) – a Damen OPV 1900 – in a ceremony held at Constanta Port, Romania on 13 February 2020. Attending the event was Vice Admiral Muhammad Fayyaz Gilani HI (M), Vice Chief of the Naval Staff, as Chief



Photo: Damen

Guest. Damen had signed the contract with the Pakistani MoD for two multipurpose OPVs on 30 June 2017, following a tender process. Damen will deliver the second vessel, PNS TABUK, in May 2020. PNS YARMOOK is capable of performing a variety of maritime operations and can transport both a helicopter and a UAV. The ship can launch two high speed RHIBs of 11.5 metres and 6.5 metres simultaneously and can also accommodate two TEUs for special mission based operations. Speaking during the launching ceremony, the Chief Guest highlighted the importance of the project for the Pakistan Navy and stated that the vessels will enhance the Pakistan Navy's capability to safeguard its maritime borders. Damen constructed the PNS YARMOOK at its yard in Galati. The yard has built nearly 40 vessels for the defence and security sector, including the last seven complex naval vessels for the Royal Netherlands Navy and the STEFAN DEL MARE offshore patrol vessel, the flagship of the Romanian Border Police.

■ Tethered Drone for Presidential Candidate Debates

(ck) Every four years, the US Presidential Candidate debates attract tens of millions of viewers. As an important political event, it is the most watched television programme in the US after the Super Bowl. On 14 and 15 January 2020, the live broadcast of the first Democratic debate of the year attracted 7.3 million viewers. For persistent aerial video



Photo: Elistair

transmission of the area, the TV channel CNN deployed an Elistair tethered drone system with the support of Vector Solutions, product reseller and tether expert. The use of UAVs has become essential for media organisations which want to offer aerial images to complement ground shots. The benefit of Elistair Ligh-T tethered station is the unlimited flight time it provides to UAVs, and its compatibility with most drones on the market. Users of the tether can now broadcast a continuous stream of aerial images to their viewers, without the need to land to change the batteries. During the Democratic debate on 14-15 January,

CNN Air flew its DJI M210 tethered to the Ligh-T at a height of 60 metres for 8 hours on the first day and 5 hours the second day. The images were instantly fed to the control vehicle and then live transmitted via a 4G link to the production team. Elistair tether stations and modules are compatible with most multi-rotor UAVs. Once connected to the micro-tether, the UAV is continuously powered and has unlimited endurance. Its flight zone is also secure as it is physically connected to the ground. This allows flexible deployments in difficult environments, particularly in urban areas with a high density of infrastructure and population.

■ Improved Processing Capabilities for SWaP-Constrained Applications

(ck) Elma Electronic Inc has expanded its line of Cisco-based mission computing systems used in rugged and harsh environments. A growing number of mission-critical, remote

Photo: Elma



applications need computing at-the-edge to ensure data integrity and system viability. Elma's new ComSys-536x family withstands the harsh environments found in transportation, disaster recovery and mining and drilling operations to provide long-term, reliable performance. Based on modular building blocks, the new ComSys-536x family utilises Elma's packaging expertise to offer many performance and expansion configurations that meet specific edge computing requirements. The Type 6 COM Express-based systems can be configured using a choice of Intel CPUs, from ATOM to XEON to provide optimum power-to-performance in a compact, SWaP-optimised platform. Other ways the ComSys-536x systems are easily adapted to a user's requirements is via expandable high-capacity SATA storage, upgradeable as mission requirements change. A host of I/O configurations spans from Gigabit Ethernet, CAN bus and WiFi to Serial I/O, ARINC-429 and MIL-STD-1553 providing fast reconfiguration as applications evolve and mandate enhancements to the I/O.

■ Mobile Counter-UAS System for Urban Environments

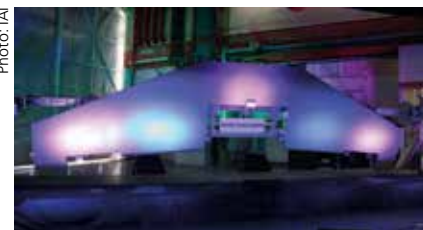
(ck) As drones are becoming smaller, monitoring the airspace to detect unmanned

threats and take action is a challenging task, particularly in an urban environment where potential targets are grouped closely together. To address this, Hensoldt and MyDefence are cooperating on delivery of a counter-UAS system for an unnamed Southeast Asian customer. The system will be integrated into anti-drone vehicles to monitor the challenging airspace of urban environments. The order is for Hensoldt's modular counter-UAS system XPELLER and MyDefence's robust RF-sensors and C2-system. The system for the civilian customer consists of one unit of Hensoldt's SPEXER 360 radar. MyDefence from Denmark adds their networked WATCHDOG 200 Direction Finding radio frequency drone detector (WD200) as well as the command and control alarm system. The system will be used in an urban environment, a new challenge for the counter-UAS solution. The counter-UAS suite allows the user to see a threat detected by the system on a map with an overlay of chosen zones. An alarm is instantly displayed on the server screen. Hensoldt's modular XPELLER system has been used, for instance, when monitoring the G7 Summit in Biarritz, protecting the Paris Air Show in Le Bourget and securing the French national parade on the 14 July in Paris. MyDefence's RF sensors have been in use since 2015 for military and civilian customers.

■ IAI to Manufacture Wings for T-38 Jet Trainers

(ck) Israel Aerospace Industries (IAI) has won a US\$240M contract to manufacture the wings for the T-38 jet trainers used by the US Air Force. IAI has been producing high qual-

Photo: IAI



ity T-38 wings since 2011, which contributed to this large award. In service with the US Air Force since the 1960s, the T-38 jet trainers' wings required replacement in order to remain operational for the next several years. IAI is manufacturing the wings for the F-16, F-35, and the T-38.

■ Anti-Drone Protection for Airports

(ck) Airport operators globally are seeking countermeasures to assist in handling the threat of drones around airport terminals and especially on the runways. The demand



Photo: IAI

for drone management solutions has grown rapidly following the incident where Gatwick Airport was forced to shut-down because of drones flying around the runway areas, affecting over 1,000 flights. ELTA Systems, a subsidiary of Israel Aerospace Industries (IAI), has tested its DRONE GUARD solution at several international airports in Europe, Latin America and Southeast Asia. The DRONE GUARD demonstration was performed during the airports' daily routine operating hours to observe how the system would detect the drones and neutralise them without hindering any flights or alarming passengers in the terminal area. DRONE GUARD is a drone detection, tracking, identification and disruption system, and has sold hundreds of units to date. It features an integrated multi-layered sensor system that includes: 3D X-band radar that detects and tracks all types of drones; dedicated COMINT system that classifies the drone by its transmission (using the information to verify the target and reduce false detection rates); an EO/IR camera used to classify the detected object; and a Jammer that neutralises and intercepts the object. The sensors are managed by a unified command and control unit. The advantage of the layered configuration is that it provides added protection should one layer fail. The system is specifically configured to operate in the airport environment.

■ Littoral Combat Ship ST LOUIS Delivered to US Navy

(ck) Lockheed Martin and Fincantieri Marinette Marine have delivered the future USS ST LOUIS Littoral Combat Ship (LCS) 19, to the US Navy. With LCS 19's delivery, the US Navy has 10 FREEDOM-variant Littoral Combat Ships in the fleet. The FREEDOM-variant LCS delivers advanced



Photo: LMCO

capability in anti-submarine, surface and mine countermeasure missions. The ship was designed to evolve with the changing security environment. Upgrades are already underway – the LCS computing infrastructures are receiving cyber upgrades and naval strike missiles are being installed in support of upcoming deployments. LCS 19 is the tenth FREEDOM-variant LCS designed, built and delivered by the Lockheed Martin-led industry team and will be commissioned in Pensacola, Florida, this summer.

■ Protected Communications for Manned-Unmanned Teams (MUM-T)

(ck) Persistent Systems LLC, headquartered in New York City, has been awarded a US\$5.4M contract by the US Army Combat Capabilities Development Command C5ISR Center to develop Protected



Photo: Persistent Systems LLC

Communications for Manned-Unmanned Teams (MUM-T). The Army envisions a next-generation Optionally Manned Fighting Vehicle (OMFV) that can be networked with up to four unmanned Remote Combat Vehicles (RCVs) and their assorted sensor/weapons payloads – and, in turn, networked with the broader force and command structure. For that to happen, these manned-unmanned teams will need a robust, secure, and high-throughput communications network. The US Army wants RCVs that can be remotely operated in groups over very long distances, in cities, forests, and open terrain. The manned-unmanned teams will also have to deal with the threat of enemy hacking and jamming. The MPU5, with its Wave Relay MANET, was previously selected by the Next Generation Combat Vehicle cross functional team (NGCV-CFT) and the Ground Vehicle Systems Center (GVSC) as the MANET network of choice for RCV Phase 1 and has been under evaluation by the US Army for over a year. Persistent is a developer in the mobile ad hoc networking (MANET) domain. Its MPU5 forms a scalable, peer-to-peer network that does not rely on external communi-

cations to run through a vulnerable central node. The MPU5, which has already been deployed on a variety of unmanned platforms, has an on-board Android computer, that runs command-and-control and situational awareness software; a 3x3 MIMO configuration with up to 10 watts of transmit power, providing a usable throughput exceeding 100 Mbps; and a built-in HD Video Encoder/Decoder to distribute multiple real-time HD video feeds to team members on demand. As part of the 14-month-long contract, Persistent is working with the C5ISR Center's Space and Terrestrial Communications Directorate to adapt the MPU5 to meet the anti-jam and cyber hardening demands of MUM-T operations. The development initiatives on this contract are already underway and will continue throughout 2020.

■ Delivery to Canada's Truck Programme Completed

(ck) Mack Defense has assembled the 1,587th and final truck for the Medium Support Vehicle System (MSVS) Standard Military Pattern (SMP) programme. The truck rolled off the assembly line on 13 February in Saint Nicolas, Quebec in front of a select group of dignitaries, military officials and Mack Defense employees. The trucks will be in service with the Canadian Armed Forces. Mack Defense is part of the Volvo Group and leveraged the Group's large industrial footprint and global capabilities to engineer and produce the MSVS SMP trucks. Before final production took place at a Prevost facility in Saint Nicolas, additional work was completed at facilities located in Bourg-en-Bresse, Marolles, Blainville and Limoges, France. The MSVS



Photo: Mack Defense

SMP programme was coordinated through Mack Defense headquarters in Allentown, Pennsylvania. Several Canadian companies contributed to the project. In 2015, Mack Defense was awarded two contracts valued at CA\$725M by the Canadian MoD. The contracts called for Mack Defense to deliver more than 1,500 8x8 MSVS SMP trucks, including variants such as cargo, material handling cranes, load handling systems (LHS) and mobile repair trucks (MRT).

■ Rheinmetall to Extend the Service Life of German MARDER Vehicles

(ck) The Bundeswehr has contracted Rheinmetall to take measures for extending the service life of the MARDER IFV. In order to maintain the operational readiness of this tracked vehicle, the drivetrain of 71 MARDER 1A5 vehicles will be replaced. Between 2020 and 2023, Rheinmetall will be supplying the German military with a total of 78 conversion kits as well as vehicle tool kits and special tools, logistical support, an initial store of spare parts, and training and instruction. The order has a value of €110M. The upgrade will expand the capabilities of the MARDER, which were first fielded by the German armed forces in 1971. As a first step in replacing the drivetrain, a new powerpack will be installed in all of

into the MARDER infantry fighting vehicle, while a new driver vision system, a thermal imaging aiming device and a fire detection and extinguisher system have also been ordered. Series contracts have already been awarded for parts of this service life extension, with performance upgrades now reaching the troops. The service life extension measures are designed to eliminate obsolescent elements in the MARDER. This contract for the German armed forces has the potential to lead to more service life extension contracts, as the armed forces of Chile, Indonesia and Jordan all use the MARDER IFV.

■ US Marine Corps to Order Additional Northrop Grumman AN/TPS-80 Radars

(ck) Northrop Grumman Corporation has received an order from the US Marine Corps for two additional AN/TPS-80 Ground/Air Task-Oriented Radar (G/ATOR) systems as part of the full-rate production Lot 2 award received in December 2019. This order completes the planned Lot 2 procurement for a total of eight systems for the Marine Corps. The order enables Northrop Grumman to keep the G/ATOR production pipeline full in anticipation for a Lot 3 award next year. In June 2019, the Marine Corps awarded-

Northrop Grumman a US\$958M full-rate production contract for 30 of the Gallium Nitride-based (GaN) G/ATOR systems. The AN/TPS-80 G/ATOR is an advanced Active Electronically Scanned Array (AESA) multi-mission radar that leverages GaN to provide real time, full-sector, 360-degree situational awareness against a broad array of threats.

■ LEOPARD 2 MBT Upgrade

(df) Intracom Defense (IDE) has signed a Memorandum of Understanding (MoU) with Krauss-Maffei Wegmann (KMW) to cooperate on the deployment of a hybrid auxiliary power solution for LEOPARD 2 main battle tank (MBT) variants, based on IDE's Hybrid GENAIRCON system and KMW's OEM platform integration expertise. GENAIRCON is an integrated Hybrid Power Supply and Management system for vehicles. The agreement coincides with the on-going activities of IDE – in cooperation with the Hellenic Ministry of Defence – on the integration of GENAIRCON

Photo: Bundeswehr/Andrea Bienert



the vehicles to boost the engine output from 600 to over 750 HP. The new powerpack will significantly enhance the vehicle's responsiveness. The MARDER fleet has already undergone significant modernisation. For example, the new MELLIS multirole lightweight antitank guided missile system has recently been integrated

Photo: Northrop Grumman



Photo: KMW



into the Greek LEOPARD 2A4. This integration will enhance the MBT's auxiliary power resilience, mission sustainment, survivability through True Silent Watch capability and lead to lifecycle cost savings. Work will be completed within the first half of 2020.

■ Could Poland Join the MGCS Project?

(mj) Poland wants to participate in a project which will lead to the development of the next generation European main battle tank (MBT). A few days ago President Andrzej Duda (Poland) acknowledged that his country might decide to procure a large number of next generation European MBTs as a partner in the joint Franco-German Main Ground Combat System (MGCS) – as long as indigenous companies have a meaningful manufacturing role in the programme. There was no indication of what this means for mid-to-long term plans for the US Army to base an entire tank division in Poland at their own cost. Will Germany and France remain sceptical about allowing Poland to join the MGCS project? Both countries preferred to work on the design of the next generation European MBT in a small bi-national consortium (in the

Find us on facebook!



Daily News – Upcoming Events

www.facebook.com/eurodefence





Photo: via author

form of the KMW and Nexter Defence Systems – KNDS – partnership), rather than to design this vital land system “by committee”. In the latter scenario, more partners mean an increased risk of project delays or cancellation. This was the case with a number of past Pan-European programmes. Poland is not known for making timely or complete procurement decisions. Will France and Germany even welcome Poland’s participation? What are the benefits to them if Poland is involved? Poland sees involvement in MGCS as a means by which it can address the main priorities of its long awaited “Wilk” programme to modernise Poland’s large, obsolete MBT fleet. Under Wilk, Poland procures several hundred next generation MBTs; however, local production is crucial for the Polish defence

industry’s health and longevity. Another MBT challenge relates to Poland’s LEOPARD 2A4 tanks, which soon will be upgraded to the 2PL standard. Their future operational use is limited as they will require replacement in due course. It is unclear which Duda’s administration prefers: to save time in the Wilk process with participation in MGCS – with Polish industrial benefits, or to buy an existing platform from a third country and “Polinise” it at a particular stage(s) of the manufacturing process with national industry participation... And what of a 100% indigenous Wilk programme?

■ MicroLite Launch in Singapore

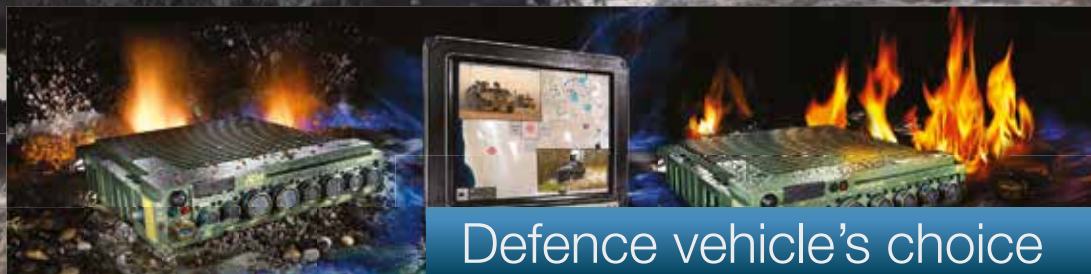
(df) At Singapore Airshow, Rafael unveiled MicroLite, a lightweight, EO/IR sensor for airborne Wide-Area Persistent Surveillance missions. MicroLite is a compact, lightweight EO/IR Intelligence, Surveillance, Targeting and Reconnaissance (ISTAR) system, for small aerial platforms such as UAVs, manned aircraft, aerostats and observation balloons. By simultaneously scanning with a high-resolution



Photo: MicroLite

MWIR and Visual HD colour sensors, it enables 24/7 Wide-Area Persistent Surveillance. In addition, MicroLite may be equipped with a LASER designator for sensor-to-shooter loop closure. MicroLite applies a gimballed-turret design, which enables horizon-to-horizon field of regard. The system also includes an onboard data processing and storage unit for real-time advanced image processing. An advanced suite of cyber defences is applied. First of its kind, Rafael’s MicroLite has been integrated onto the ORBITER-4 UAV by Aeronautics, to begin flight tests. This is the first example of the tight synergy created by a Rafael product and an Aeronautics platform, after Rafael acquired Aeronautics last year.

AFCEA exhibition | 1st & 2nd April 2020 | World Conference Center Bonn | Booth S10



Defence vehicle’s choice

More capability, more flexibility, more power - the CENTURION i7 vehicle computer from the ATM ComputerSysteme GmbH is the central information backbone for extreme environmental conditions. The CENTURION i7 has a sustainable architecture for the projects of today and tomorrow.

| www.atm-computer.de |

ADVANCED TECHNOLOGY
FOR MILITARY-FORCES

ATM
Tec-Knowledge®

ATM ComputerSysteme GmbH | +49 7531 808-3 | info@atm-computer.de

Frontex Ready to Meet New Challenges

Michał Jarocki

In 2015 the European Union experienced a flow of illegal migrants and refugees on an unprecedented scale, which was not seen before in the entire history of the EU and resulted in a political crisis threatening the future of the whole Schengen area. In result, major European institutions and particular EU member states, especially those, which were the most affected by the migrant crisis, recognised the need for working out and implementing a number of new regulations, which would enhance their ability to protect EU's external borders and fight all current and emerging types of cross-border crime.

In result, last year the European Parliament and Council passed a new regulation which gave the European Border and Coast Guard Agency (Frontex), the sole EU-level institution tasked with and capable of protecting European external borders, a new toolset to meet the rising challenges and combat emerging threats to the EU's internal security, such as illegal migration, weapon's smuggling or slave and child trafficking.

The new regulation gives Frontex better means to provide effective assistance to EU member states and Schengen associated countries and certain EU institutions, to increase Europe's internal security and prosperity and to improve the way the EU's external borders are managed and protected, thus ensuring a high level of security for all its citizens.

The new regulation identifies the need and lays the ground for the creation of the Europe's first uniformed service, the future European Border and Coast Guard standing corps. Following its creation, the corps will provide Frontex with a 10,000-strong force composed of border and coast guard officers, who will assist national authorities with border control and migration management.

'With our own standing corps and own equipment, Frontex will be a daily partner for national authorities to design sustainable border management capacities rather than simply responding in a crisis management mode. Our operational aim is to have well-functioning external borders, ensur-

Photos: Frontex



In the wake of the migrant crises that affected the European Union in 2011 and particularly in 2015, the European Border and Coastal Protection Agency, also known as Frontex, has gained new legal and practical capabilities to address the ever-growing threats to the EU's external borders and Europe's internal security.

ing trust in our European Area of Freedom, Security and Justice', said Fabrice Leggeri, Frontex Executive Director.

To Respond in a Timely Manner

Under the new regulation, Frontex will put more pressure on strengthening Europe's ability to respond to any kind of challenges or threats at its border, whether its illegal migration, drug trafficking or smuggling of weapons, by sharing relevant information and gathered intelligence within particular EU member states, as well as other pan-European security institutions. The Agency will also conduct more frequent and in-depth risk analyses, which will focus on detecting weak spots in EU's border protection system and finding ways to eliminate them, as well as predicting the challenges

which lay ahead of Europe's external border protection policies for years to come. The reason why the system of exchange of information and intelligence between Frontex and certain EU member states needs to be improved is the need to enhance the capacity of the Agency and its national partners to respond rapidly to any type and form of emerging threat. This includes those challenges that already pose a real risk to the EU's internal security and others that may arise in the near future.

One of the ways to achieve this objective is to maintain the current capacity for border control and migration management thanks to constant, 24-hour monitoring of the situation at the EU's external land and sea borders, as well as to monitor the situation in non-EU countries, such as in the Western Balkans region.

Author

Michał Jarocki is an independent, Warsaw-based defence expert who has reported on security issues and developments from a qualified "insider" position for many years.

Analyse, Advise, Implement

Furthermore, Frontex intends to improve its capacity to carry out annual or multi-annual risk assessments of the EU's ability to meet a wide range of external border or internal security challenges. As a result, the agency will be able to advise certain member states and partner institutions more effectively on how to protect the Schengen area from uncontrolled migration flows and refugees who, if not properly controlled, could pose a threat to the security of EU citizens.

Frontex will also seek to advise EU member states on procurement and installation of technical equipment, which will enhance their abilities to protect the Schengen area from illegal incursions and to tighten control on the EU's external borders. According to the Agency, the main focus will be on procurement of new patrol vehicles and vessels, as well as helicopters and unmanned aerial vehicles or other types of observation systems, which will be deployed all across the border and, on particular occasions, within non-EU member nations.

More Human and Technical Assistance

The new resolution will give Frontex more capabilities as well as human and technical resources to provide the EU and Schengen area member states with a wide range of operational services, which will enhance the effectiveness of border surveillance and border control. The Agency will also seek to improve its abilities to detect and control the flow of migrants and refugees in Europe, which will be achieved by better and more in-depth background checks, including determination of migrants' coun-



The European Parliament and the Commission have decided to create a permanent European Border and Coast Guard Corps of 10,000 men and women, which will enable Frontex to better respond to emerging threats and transform itself from a reactive institution into one that is very actively engaged in protecting the EU's external borders and the integrity of the Schengen area.

tries of origin, their age or the real reason for which they decided to cross the EU's external borders, often illegally. Furthermore, the Agency will also continue to strengthen the role, which it plays in foreseeing, detecting and fighting all other types of cross-border crime, such as weapons trafficking or smuggling of minors or slaves. In this regard, Frontex identifies the urgent need for reinforcement of cooperation between all EU member states. This relates not only to those countries, which share their part of the EU's external border, but also the ones deep within the Schen-

gen area, like France, Germany or the Netherlands, which very often are the final destination of smugglers and traffickers.

Legitimate Travelling Requires Improved Control

Looking into the future, Frontex will also play a bigger role in helping to maintain control over and management of ever growing flow of legitimate travellers all across the EU's external borders. This includes not only land border crossing and seaports, but also international airports, which also constitute particular sectors of the Schengen area.

To make this possible, the Agency will host the central unit of the European Travel Information and Authorisation System (ETIAS). It will also assist certain EU member states in the implementation of the entry/exit system. The system will make it possible to monitor whether a third-country national has left the EU in accordance with the time constraints of his/her visa, in particular when he/she enters and leaves the EU at two different border crossings, seaports or airports. A similar system has already been introduced in a number of countries outside Europe, such as the USA.

Active rather than Reactive

The new regulation also foresees that the Agency must improve its readiness to face and tackle the challenges facing the EU ex-



A better and faster exchange of information and intelligence between Frontex, the EU member states and the European institutions is a key factor in improving the security of the EU and the Schengen area.

ternal border management system before, or at least at the time of, the emergence of the crisis, not afterwards. In other words, Frontex will have to act more actively rather than reactively when the threat to the EU's internal security is imminent and its institutions can only try to limit the extent of its negative consequences.

In this respect, Frontex will need to strengthen its capacity to monitor the situation at the EU's external border by cooperating more closely with certain EU member states, and to monitor the security situation in selected EU partner countries and in regions of particular interest, such as the Western Balkans. Improving the exchange of data and information by sending more border guards and liaison officers to these countries could help the Agency and the EU to identify the growing threat more promptly and to better prepare appropriate response options.

More inter-EU Cooperation

In order to improve the management of the EU's external borders, Frontex will seek to strengthen pan-European cooperation between certain member states and EU institutions. In this context, the agency will act as guardian of the integrated management of Europe's borders. Frontex will therefore lead to further harmonisation of the rules and standards applied by interested parties in order to better manage external borders and address a wide range of challenges, including migration and security threats.

In cooperation with national authorities and selected EU institutions, international agencies and organisations, Frontex will seek to implement an effective, integrated strategy to better manage the movement of people, including legal visitors, across the EU's external borders in order to monitor and control this process. As a result, the agency and its national and international partners will be better able to distinguish between legal visitors entering the Schengen area and migrants or refugees, in particular those wishing to cross the EU's borders illegally, unchecked and uncontrolled.

Frontex will have to develop an integrated strategy to improve capabilities, contingency planning and maintaining operational readiness across the EU's external borders as well as within the member states and the organisation responsible for protecting the Schengen area from illegal border crossings. In addition, the Agency will assist all member states, albeit in an appropriate manner, in the preparation of a national capability development plan, which could relate to the employment of more border



Under the new legislation, Frontex will carry out annual and scheduled risk assessments of the EU's readiness to meet a wide range of external border and internal security challenges and will provide assistance and advice to certain EU member states to improve their capacity to protect Europe's security.

guards and the improvement of their qualifications or the acquisition of additional technical equipment such as patrol boats, cars, helicopters or aircraft.

Formation of Standing Corps

As a consequence of the above-mentioned migration crises of 2011 and 2015, which had far-reaching consequences for the internal security and policies of the EU, the European nations understood the need to create an independent, solely managed force responsible for the protection of the EU's external borders and guaranteeing a prosperous future for the Schengen area. Shortly after, EU member states and institutions took a decision to reform Frontex by giving it a stronger mandate and more adequate resources in order to improve its

border protection and control capabilities and creation of a European Border and Coast Guard standing corps.

The EU Parliament and Council state that the new standing corps will "gradually but swiftly reach the strategic target of having a capacity of 10,000 operational staff", out of which 3,000 will be recruited directly by Frontex among border guard, police and customs professionals from particular EU member states. Further 1,500 border guard officers will be provided by EU countries on a two-to-four-year basis. The rest will be deployed on a short term secondment.

According to the EU legislation, "such a capacity (...) represents the maximum available capacity required to effectively address existing and future operational needs for border and return operations in



One of the key factors leading to the improvement of the EU's border security is to increase the quantity and quality of personnel and technical equipment that can be deployed along the European external borders. The procurement of new patrol vessels, cars, helicopters or aircraft by certain EU member states should be considered an urgent necessity.



Frontex and its permanent corps will need to cooperate more actively and effectively not only with certain EU member states and institutions, but also with third countries in focus regions such as the Western Balkans.

the Union and third countries, including a rapid reaction capacity to face future crises”.

The Frontex standing corps will have select executive powers, which will allow it to effectively support particular member states in their efforts to protect EU external borders from illegal migration and other types of cross-border crimes, as well as to provide security of the Schengen area. Additionally, the Agency, by the use of its particular assets, such as the standing corps, will further assist particular EU member states in organising effective system of returns of irregular migrants to their countries of origin.

The new regulation sets up a strict timeline for the creation of the new standing corps. The institution is expected to reach the final operational capability status by 2027, with the ability to deploy a declared 10 000 men and women strong force of border guards, ready to rapidly react to any emerging or foreseen threats or emergency situations. However, before the first members of the Frontex standing corps could start their work, they will have to undergo a training course and a range of tests, confirming their professionalism, skills and psychological features, enabling them to provide the required level of security to European external borders, in compliance with EU law and standards.

The recruitment of the first batch of 700 officers has already started. So far, the Agency received around 7 500 applications. Most of the candidates come from the border guard, customs and police institutions from all of EU member states. According to the current timeline, the first Frontex border guards should be ready to enter service and take on their duties in January 2021.

Frontex border guards, who at any given time will work under the command and auspices of the national authorities of the country, in which they are deployed, will be responsible for supporting the EU, the Agency and partner nations in a number of tasks, such as: control and monitoring of land, sea and air borders, border surveillance, collecting and sharing of relevant data and intelligence, search and rescue of migrants and other persons in distress, return flights of migrants and refugees, who were declined a right to stay in the UE or independently decided to return to their countries of origin, as well as fighting cross-border crime, like weapons smuggling or slave trafficking. These tasks will be performed either within the Schengen area, especially along EU external borders, as well as in non-EU countries, assuming they sign a special Status Agreement with the EU. ■

HEMUS 2020
DEFENCE, ANTITERRORISM AND SECURITY

XIV International Defence Equipment and Services Exhibition

27th – 30th May 2020, Plovdiv, Bulgaria

**CELEBRATING
A 25 YEAR
TRADITION**

*“An event where the West and the East match interests”
“A platform on which the European Union meets its partners”*

Under the auspices of THE MINISTRY OF DEFENCE and THE MINISTRY OF ECONOMY



manager@hemusbg.org • www.hemusbg.org

TRADITION of a quarter century
25 years since the first edition

INNOVATION

Strong presence of R&D,
Science and University Sectors
Tailor-made solutions

EXPERIENCE

Live firings and demonstrations,
Conference, Forums, Meetings

INTERNATIONAL

350 VIPs from 60 countries invited
Visitors from EU and NATO Institutions,
EDA, NCIA, NSPA, STO, etc.



Linked In: 'Hemus' IDEE



REGIONAL

High importance on the Balkan
region 12 countries within 700
km distance

EXHIBITION by name, EXPERIENCE by nature

“The EU’s external borders are only as strong as their weakest link.”



Photo: Frontex

After the migration crisis of 2015, the EU agency Frontex was significantly strengthened. Today, when an EU country is under strong migratory pressure, it can count on additional support from Frontex in the form of technical equipment or specialised border and coast guard officials. ESD had the opportunity to speak with the Frontex Spokeswoman Izabella Cooper.

ESD: What are the main challenges ahead of Frontex in 2020 and years to come?

Cooper: Let’s start, maybe, with Frontex itself. It is an EU’s agency, which was set up 15 years ago. Originally, it was set up with the task of providing technical assistance to those countries of the EU, which have an external border and that might need additional support.

A large part of EU countries belongs to the free movement area of Schengen. It means that if you want to travel from Malta all the way to Helsinki you can actually do it without being stopped at a border to show your travel documents. This is valid for both persons and goods.

Let me give you a practical example: before Poland joined the Schengen area, the external land border of the EU was in Germany. When Poland became a member of Schengen, the border checks along its western border were dismantled. From that moment on, in a way, the German external border moved to the Polish-Ukrainian border. Countries, which do not have an external EU land or sea border have to rely on the quality of border checks and surveillance performed by those countries, which do. Schengen has changed the way countries now think of their borders. Let me give you an example: if a passenger manages to enter the airport in Warsaw using false documents, he or she can then travel to Berlin without any hindrance. A twelve-year-old girl trafficked via sea to Italy may be then easily moved to a brothel in Hannover to be sexually exploited there. Drugs trafficked from Morocco to Spain may end up being

sold in front of a school in Berlin, weapons hidden in a truck entering Austria may be used to commit a terrorist attack. Having only one external border puts enormous responsibility on the countries which have one, but it also obliges all the others to offer solidarity if the former face challenges at their borders.

This is why it is very important that border authorities of all countries work together to ensure that the external borders of the EU are safe and duly protected.

ESD: What role does Frontex play in this process?

Cooper: This is exactly where Frontex comes in. Over the past 15 years we saw the migratory flows moving very fluidly through all EU borders. Few people remember that some 12 years ago the vast majority of migrants entering Europe did so via the Canary Islands. Then, after Spain signed bilateral agreements with Mauritania and Senegal and installed SIVE - sort of a radar control system along their southern maritime borders - the flow moved to the central Mediterranean. And then, after more stringent measures adopted by the Italian authorities, the flows moved to the Greek-Turkish land border. Then to the Greek-Turkish sea border.

In 2011, the Arab Spring resulted in 64,000 migrants and refugees arriving at the Italian shores – at the time, it was a historical record. Four years later, we witnessed the dramatic events of 2015 when 886,000 refugees and migrants arrived from Turkey on five small Greek islands in the Aegean and about 154,000 in Italy.

It was in 2015 that it became clear to all that Schengen external borders are only as strong as their weakest link. Because, whoever managed to enter Italy could then freely move within the Schengen area. Since Greece is surrounded by non-Schengen countries, the refugees and migrants had to cross the Western Balkans and then enter the EU mainly via Hungary or Slovenia and then re-enter the Schengen area, if they wanted to reach Germany, Sweden, France or other countries.

The year 2015 well explains what Frontex could do then and what it can do now, as its mandate was significantly changed as a consequence. When an EU country finds itself under really strong migratory pressure, it can count on additional support from Frontex in the form of technical equipment or specialised border and coast guard officers. But our assistance is not limited to management of migratory flows: we can help when the external borders are affected by any form of serious cross border crime: drug or weapons trafficking, foreign fighters, trafficking in human beings, forged documents etc.

But let’s go back to the events in 2015 when almost 900,000 refugees and migrants arrived in Greece – almost one tenth of the country’s entire population – in one year. The Hellenic authorities could not cope by themselves. They badly needed help with search and rescue, identification and registration of the incoming migrants, security checks, fingerprinting. There were a lot of asylum seekers among those, who were arriving. That put additional pressure on the asylum authorities. There was an urgent

Nexter,

Land defense architect and system integrator in France, is a major reference in armored combat systems, artillery, and in the ammunition field. Nexter designs innovative solutions for land, air, sea and security forces, in order to bring French and foreign armed forces a **decisive operational advantage**.

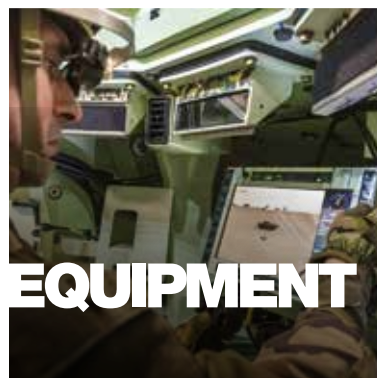
ARMORED VEHICLES



TURRETS & GUNS



AMMUNITION



EQUIPMENT



ARTILLERY SYSTEMS

CREATING REFERENCES IN DEFENSE

nexTER
A COMPANY OF

**K
N
D
S**

need to provide them with shelter, food, medical assistance to all those people. You can imagine what it meant for the Greek authorities when 5000 people arrived on small, unseaworthy dinghies in one day to one island each day.

ESD: How Frontex can assist those countries in such a crisis?

Cooper: The priority was to save lives at sea. The national authorities simply did not have sufficient amount of technical equipment and border guards to manage such a dramatic situation by themselves. Frontex can coordinate the deployment of additional vessels from various EU countries, patrol planes

ing to Greece in 2015 were refugees: Syrian, Afghan and Iraqi nationals, many claimed false nationality to increase their chances of asylum. Here Frontex deployed numerous screeners to assist the Hellenic authorities to establish their real nationality.

It was also important to ensure that more in depth checks were conducted towards possible suspects who may have attempted to take advantage of such huge number of people crossing. Our officers also assisted the Greek authorities with collecting information about the criminal networks operating in the countries of transit – we always share this information with the national authorities and with Europol as they have the

copters and border guards. I must say, it had never been easy to secure the sufficient amount or both. In 2015 it nearly proved impossible.

As the wave of refugees and migrants moved across the Schengen zone, the individual countries of the EU introduced temporary border checks with their neighbours. This was also quite unprecedented. The Schengen Borders Code does allow to do this in exceptional situation. For example, Sweden reintroduced border control with Denmark. But this was not what Schengen was about. The priority for the European Union in 2015 was to strengthen the external border and yet countries like Sweden, Germany and Austria were receiving people, whose fingerprints were nowhere to be found! It was clear that this situation could not happen again.

In the middle of 2015 Frontex Executive Director asked for additional 7000 officers to be deployed to Greece and Italy. We really struggled to make it happen. It took us a few months to do that. To convince the member states. The priority was, if we were to preserve Schengen, we really had to secure the external borders, where this control should have been in the first place.

It did happen eventually. Other measures were also taken, such as the individual countries in the Western Balkans became more active in controlling their borders. EU-Turkey agreement was signed. By deploying sufficient number of additional officers in Italy and Greece, we finally managed to help these countries manage the flows effectively.

I want to stress that all the officers and technical equipment deployed by Frontex operate under the command of the national authorities of the countries which host our operations. As we speak, there are about 1400 Frontex officers, coming from all 28 EU countries as well as Schengen associated countries, like Iceland and Switzerland. They are deployed not only at the maritime borders, where we've got around 40 vessels, several helicopters and aircraft, but they are also present in the countries surrounding the Western Balkans and at tens of international airports. Let's not forget that international airports also constitute an external border.

ESD: Can we assume that all these tasks, which you have mentioned, are up-to-date even today? Maybe some of them today constitute a threat of a smaller scale that just a few years ago, but they're still perceived by you as a threat to EU's internal security?

Cooper: Absolutely, and keep in mind that our mandate in the past 15 years was amended seven times, which is really quite unprecedented for any European agency.



Frontex is based in Warsaw, Poland, where it coordinates border security operations across the EU's land borders, sea ports and international airports. In the coming years, the agency will increase its staff, both in terms of border guards and clerical staff.

for border surveillance to ensure on one hand that we could detect boats in distress, but also to make sure that nobody entered the EU undetected. Schengen Borders' Code requires that all those entering the EU in an irregular manner must be fingerprinted – and that their fingerprints be inserted in the Eurodac system – that they all be registered and identified. Here our agency can deploy additional border guards to assist the country in difficulty. If you only have one external border, you have to know who enters the area of free movement, what their backgrounds are, and make sure that the documents used are not forged. Many of the migrants had no documents whatsoever, others had some, but rather than passports these were drivers' licences, birth certificates or others. Many documents were forged – you can imagine that the criminal networks in Turkey and in other countries operated a very profitable business selling fake documents, so it was important to ensure these were seized. While the vast majority of those arriv-

ing to Greece in 2015 were refugees: Syrian, Afghan and Iraqi nationals, many claimed false nationality to increase their chances of asylum. Here Frontex deployed numerous screeners to assist the Hellenic authorities to establish their real nationality. It was also important to ensure that more in depth checks were conducted towards possible suspects who may have attempted to take advantage of such huge number of people crossing. Our officers also assisted the Greek authorities with collecting information about the criminal networks operating in the countries of transit – we always share this information with the national authorities and with Europol as they have the

ESD: How big of a challenge was the crisis of 2015 for Frontex?

Cooper: In 2015, considering the scale of arrivals, we really struggled to help. For two reasons: one was that our mandate in 2015 made us rely on border guards and technical equipment provided to us by the member states. So, when we planned our operations in Greece, Spain, Italy or in other countries, we would devise an operational plan and then make a call for contributions.

As Frontex did not have its own equipment or border guards, each country would be asked to contribute with their boats, heli-

We started with a mandate in 2004, which was amended three times. The European Council changed our mandate in 2016 as a consequence of 2015 events. The biggest change, and it was really of historic magnitude, took place last December.

ESD: Which of those challenges you perceive as most disturbing at the moment?

Cooper: The challenges are plenty as there are different forms of cross border crime. The role of Frontex is focusing increasingly not, as it used to be, only on the management of migration, but in assisting the member states in fighting various forms of cross border crime.

We are increasingly focusing on addressing serious forms of cross border crime. This includes drug and weapons trafficking or terrorism. Detection of foreign fighters also features high on our agenda. If you think about it, they are holders of EU passports, so addressing this phenomenon requires a significant level of awareness, training of border guards on how to profile and detect them, in order to signal them to the national police.

ESD: How does Frontex cooperate with authorities of countries, which its officers are deployed in?

Cooper: As I already mentioned, the officers deployed by Frontex always work under the command of the national authorities. If a French officer is deployed on the island of Lesbos by Frontex, that officer will be working under the command of the Hellenic authorities. If a German officer is deployed in Italy, he or she will be working under the command of the Italian authorities. Our role is not to replace, but to help the national authorities in facing challenges at their borders.

As in 2015 it became clear that Schengen borders are only as strong as their weakest link, an important part of our mandate in 2016 was addressing the weak links in the EU's external border system. European legislators - the heads of 28 states, together with the European Parliament and the Commission - that one way of preventing the future crises was to ensure there be no weak links. That we proactively identify and eliminate the vulnerabilities, so that we are all better prepared to avoid the crises from happening.

ESD: How could this proactiveness look like?

Cooper: An important part of our task is to conduct annual vulnerability assessments of the border and the coast guard capacity of each EU member state. We do this by look-

ing at the national capacity - for example the number of border and coast guard officers, the number and types and technical equipment, the level of their training, contingency plans etc. We correlate that with the types of risks that different border sections may be exposed to and we run crisis scenarios. Based on this we issue recommendations. Vulnerability assessments are obviously classified documents.

One of the biggest challenges for Frontex in the upcoming years is the implementation of the latest mandate of December last year. It brought a change of historical magnitude for Frontex. Among many new areas, probably the biggest one is the creation of the European border corps. It will count 10000 officers, 3000 of which would be recruited directly by Frontex. With the new regulation we will no longer have to rely exclusively on the officers provided to us by the member states, but we will have 3000 European border guards who will be entirely at our disposal. Our own staff.

ESD: How will the new regulation change your capabilities in comparison to what you had to deal with until now?

Cooper: At present, if we have the Polish Border Guard going to the island of Lesbos to take part in our operations, they would be

HONORARY PATRONAGE
THE PRESIDENT OF THE REPUBLIC OF POLAND
ANDRZEJ DUDA



BALT MILITARY EXPO

16TH BALTIC MILITARY FAIR



THE 9TH INTERNATIONAL TECH-SCIENCE CONFERENCE
ON NAVAL TECHNOLOGIES FOR DEFENCE AND SECURITY.

GDAŃSK, POLAND
22-24 JUNE **2020** amber **expo**

WWW.BALTMILITARY.PL



TO BE
good here

wearing a national uniform and a blue arm-band. This is how you will be able to tell that these officers are deployed by Frontex. This is absolutely unprecedented development. So, we will have 3000 officers belonging to Frontex and 1500 officers who will be provided by the member states for long-term deployments lasting from 2 to 4 years. The remaining officers will be available to

dates per place. This is good and will help us select high quality personnel. The applicants not only come from border authorities, but also from the police, customs, emergency services, etc.

We're currently finalising the shortlisting of the candidates. Obviously, they will have to undergo medical tests, psychological and language test. They have to be trained. We

text will be increasingly able to assist with the logistical side of returns.

I would like to stress that the return decision remains exclusively with the national courts or administrations. While Frontex cannot enter into the merit of such decisions, will be able to assist with such issues as the acquisition of travel documents, and transportation by air. We can cover the costs of their returns. Because of the new regulation, with Frontex we can also assist with voluntary flights, or flights on commercial flights.

ESD: Will Frontex, under the new regulation, deepen its relations and ties with non-EU countries in dealing with the broad range of challenges to the EU and Schengen area?

Cooper: Certainly, the cooperation with non-EU countries is of crucial importance. We are now able to run operations not only on the territory of the EU, but also on the territory of non-EU countries with whom the EU signed the status agreement. So far, we are coordinating such operation in Albania, this year we will look to the possibility of expanding it to other countries of the Western Balkans.

ESD: Will you also seek to enhance information and data sharing between particular EU member states, as well as non-EU actors?

Cooper: Sharing information in a timely manner is really crucial. If you think that maybe 20 years ago countries like Spain, Italy or Greece really knew mostly what was happening at their borders only, but had a rather limited knowledge of the situation in other countries. With Schengen, it is crucial that Greece knows, what's happening in Spain. That Poland knows what latest methods of document forgery detected by German police, or Greece about the latest case of a child – trafficking attempt in France. Criminal networks will only be able to run a profitable business if they are one head ahead of law enforcement. If we only have one external border, we all have to be equally effective in preventing it. Frontex plays a big role in collecting and instantly sharing information about everything that happens at any external border in Europe among all border authorities of the EU member states.

But situational awareness is not everything: we also conduct risk analysis both on tactical and strategic level. This allows us to forecast what will happen in the future, so that we can plan our operational response accordingly.

The interview was conducted by Michał Jaroński.

Picture: The Polish Ministry of Interior Affairs



Member states which, like Poland, have an external EU border of their own actively contribute to the security of the Schengen area by sending their border guards not only within the EU territory but also to partner countries such as Macedonia.

Frontex on short-term secondment. This will allow us to be more self-sufficient and to guarantee a more permanent presence of additional officers across European external borders.

This is really important, because up to now it was very difficult for us to flexibly respond to changes. As I said at the beginning, in the past 15 years, these changes were very significant. Until recently, for administrative reasons it was very difficult for us to move the officers for example from Greece to Spain. Having the corps of our own officers will allow us really to react according to the situation. We will not depend on the national restriction of any sorts. It will allow us to be much more proactive, able to respond much faster and much more efficiently at the external borders of the European Union.

ESD: What is the timeline for the corps to be created and to reach full operational capability?

Cooper: According to the regulation we have until 2027 to form this corps. While it only entered into force a month ago, we have already launched the recruitment of the first 700 officers. We have received 7500 applications, which is some 10 candi-

will deploy these first 700 officers to our operations on the 1st January next year.

ESD: How will this new capability change the way in which you deal with crises along EU's external border?

Cooper: We will no longer merely react to crises when they occur. We will also be able to better predict them thanks to our risk analysis, our intelligence. We will be better able to respond to them as we will have more officers deployed permanently. Having our own officers will allow us to be much more flexible and self-sufficient in our operational response.

ESD: What about dealing with other challenges aside from illegal migration?

Cooper: Another important challenge is returns. I would like to stress that there is no question that the refugees, those who have to right to international protection or asylum, must be given such protection. However, not all the people who are coming to Europe are refugees. When the national judges decide that some individuals do not have sufficient grounds to remain on the territory of their country, they have to be returned back to their home countries. Fron-



Viewpoint from Dublin

Photo: Tommy Martin



A Seismic Shift to Sinn Féin

Tommy Martin

Ireland was a bemused, confused, and annoyed observer at a UK Parliament struggling to reach any kind of consensus on Brexit. Many didn't understand how a nation could get itself into such a state of ineffective governance by pa-

ralysis – but given the recent inconclusive Irish election result, we too are likely to experience a similar period of uncertainty and frustration, at a time when stable government is so needed and necessary.

Fianna Fáil or Fine Gael

For the past 100 years, Ireland has been governed by either Fianna Fáil or Fine Gael, both centre right political parties. While both parties routinely formed coalitions or alliances to acquire the magical “overall majority” needed for an effective Government, what was always intriguing, is that those politicians Fianna Fáil or Fine Gael coalesced with, usually had much less in common in terms of political ethos, than Fianna Fáil or Fine Gael had with each other!

In the complicated world of Irish politics, in many ways, Fianna Fáil and Fine Gael can be likened to the “Pepsi challenge” – they both look similar, they both taste similar, but there are subtle differences between them. In the Ireland in which I grew up, most people aligned with one party or the other, and this usually defined whether your family was pro or anti the Anglo Irish Treaty, and which side your family took in the subsequent bitter and divisive Irish Civil War.

The Pepsi Challenge

So what has changed? Fine Gael, who were the minority Government for the past number of years, and were supported through a “Confidence and Supply” arrangement by their arch rivals Fianna Fáil, faced the electorate in expectation of being rewarded for steering the country through the difficult and protracted period of Brexit negotiations. Fianna Fáil on the other hand, wondered if the electorate had finally forgiven them for presiding over the economic crash that devastated families, finances and futures a decade earlier.

Wearing a green blazer, Mary Lou-McDonald, the leader of Sinn Féin, has scored high in the elections which rattles Irish politics.

Both Fianna Fáil and Fine Gael pointed to the improved and improving finances of the State, and both laid claim to the renewal of prosperity and full employment experienced by many citizens. Most commentators predicted that neither was likely to win an overall majority, but as before, one or other might win enough seats to enter coalition with other parties.

But beneath the surface, all was not well in the State of Ireland. Homelessness, Hospital waiting lists, political scandals, and a realisation by many young people in particular, that they were unlikely to enjoy the prosperity their parents had seen, left many feeling they were collateral damage from the economic crash.

Sinn Féin captured the mood of those who felt that the traditional political parties had failed them. Many who voted for Sinn Féin in this election, would never have considered voting for them before, and may never do so again, but such was the level of dissatisfaction with the main political parties, they did so in droves.

Older voters, with memories of a Sinn Féin party embroiled in the Northern Ireland troubles, struggled to understand this seismic shift to Sinn Féin, but realpolitik and the drive for change, has seen Sinn Féin finish the election with the same number of Parliamentarians as both Fianna Fáil and Fine Gael – giving us a three way tie and no obvious path to a stable Government.

Ireland has never had a clear Left/Right political divide, but that possibility is now a significant consideration, following Sinn Féin's dramatic rise, and the potential that they may sometime soon, find themselves in Government on both parts of the Island of Ireland. But the nagging doubt for Sinn Féin must be that all this is just a protest vote, like so many other Referenda rejected before in Ireland, not on the stated content or intent, but on local dissatisfaction with the underlying mood music.

The recent Irish General Election of 2020 should live long in the memory because of the seismic change it has the potential to introduce to Irish society. But Irish political history has borne witness to similar votes for significant change in the past, before that which was promised with such optimism, fizzled and died on the pyre of politicians' broken promises.

It will be interesting to see what occurs over the coming weeks – but be sure of one thing, nothing will ever be quite the same again.



Photo: Sinn Féin

Military Cooperation between Israel, Greece and Cyprus

Eugene Kogan

The trilateral military cooperation, begun in November 2017, has all the necessary components to become decisive for the three countries in the eastern Mediterranean in the long-term. In addition, the US is fully behind the three countries, sending a clear signal to Ankara not to provoke conflict in the region.

Turkey, which is still a member of NATO, is not in a position to prevent Israel from cooperating with NATO, although such cooperation is a thorn in the side of Turkey. Although Cypriot military exercises with Israel upset Turkey, it cannot prevent the two countries from cooperating. That is why we see a new military architecture in the eastern Mediterranean, which will shape the security relations of the three countries in the coming years.

This new architecture was not created in a vacuum, but is a by-product of the steadily deteriorating Israeli-Turkish relations, which reached a nadir with the 'Marmara incident' in May 2010. Although the Israeli government has officially apologized for operational mistakes in dealing with the Turkish flotilla ships and a compensation package has been negotiated in mid-2016, bilateral relations remain frosty. Moreover, the military component of Israeli-Turkish relations, which used to be a backbone of relations, is still missing and is unlikely to reappear in the near future. For this reason, Israel began looking for like-minded partners in the eastern Mediterranean as early as 2012. And these partners are not only Greece and Cyprus but also other NATO members, since Greece is a member of NATO.

From Air Forces and Navy Multinational Cooperation

Trilateral military cooperation began in November 2017, while the first 'Blue Flag' multinational exercise in Israel, including Greece, Italy and US, took place in November 2013. In October 2015, a follow-up air

Photo: US Navy



An Israeli Sailor during Exercise "Noble Dina 2016" in Souda Bay, Greece, in 2016. "Noble Dina" is an annual trilateral exercise involving US, Hellenic and Israeli forces to increase interoperability and tactical expertise in a number of warfare areas.

drill pitted Israel, Greece, Poland, and US against a fictional enemy state. Another air drill with participation of France, Germany, Greece, India, Israel, Italy, Poland and US took place in March 2017. Lieutenant Colonel Richard Hecht, Israel Air Force's (IAF's) Chief of International Affairs, said that "the Blue Flag exercise is not a competitive event. It is about partnership. Furthermore, it is not only the exercise itself but the build-up to the exercise where we have all the participants planning together, getting to know one another, building relations and talking about how we fight".

In March 2017, the IAF participated in the joint exercise 'Iniohos 2017' in Greece, in which Italy, the United Arab Emirates (UAE) and US also took part. The follow-up exercise 'Iniohos 2019' of the Air Force with participation of Cyprus, Greece, Israel, Italy, UAE and US took

place in April 2019. The most recent 'Blue Flag' exercise, in which Germany, Greece, Israel, Italy and US participated, took place in November 2019. It served as an opportunity to improve interoperability between the aforementioned air forces.

In November 2017, officers and sailors of the Israeli Navy were invited by the Greek Navy to participate in a NATO exercise. Crews from Bulgaria, Greece, Israel, Italy, Romania, UK and US, as well as international observers, held land briefings and planning meetings. In the second week, they went into action and rehearsed a series of scenarios. Such scenarios included sea-based anti-terrorist operations, handling enemy swarm boats loaded with explosives, making threats from the air, and practicing how to rescue stranded ships and provide medical care to injured people. Lieutenant Colonel Yaniv Lavi, Commander of the Israeli Navy's 32nd Squadron,

Author

Eugene Kogan is a defence and security expert based in Tbilisi, Georgia.

said that “the learning process was mutual. We learned from the others, and we passed on our knowledge. We are improving all the time.”

Lieutenant Colonel Assaf Boneh, Head of the Israeli Navy's International Cooperation Planning Branch, noted that Israel has benefited immensely from the growing maritime partnership. For example, Greece operates similar vessels to Israel's – such as German-made air independent propulsion submarines. Boneh acknowledged that “Maintaining such submarines is a complex matter and requires a lot of knowledge. The Greeks have technical knowledge on maintenance and we are happy to learn from them. We expect our cooperation with Greeks and others to only increase.”

That is exactly what happened. In August 2019, the Israeli navy, with the participation of ten other navies, led an exercise to prepare the country for a devastating earthquake. This was the first time that the navy had conducted a large-scale exercise focusing on the sea-based response to a severe earthquake. The ten foreign navies included Canada, Cyprus, France, Germany, Greece, Italy, NATO, UK and US and the non-aligned country of Chile.

Another naval exercise was the 'Noble Dina' exercise, which began in April 2012 with the participation of Greece, Israel and US. It has been conducted annually since then. The most recent exercise, 'Noble Dina', in April 2019, stretched from the north of the island of Crete to the eastern Mediterranean Sea and involved ships from Greece, Israel, US and Cyprus.

It can, therefore, be expected that multinational cooperation between like-minded nations such as Israel and Greece will intensify in the coming years, as the participants not only learn each other's tactics and strategy, but also gain insights into the strengths and weaknesses of pilots and sailors in an unfamiliar air and sea space operation.

Bilateral Cooperation

The first-ever IAF and HAF joint exercise in Israel took place in December 2016. Colonel Amnon, Commander of the Ramat David Air Force Base (AFB), noted that: “The Greek deployment was of historical significance because the AFB usually does not host foreign fighter division deployments. This was a trailblazing event. The last time foreign fighter aircraft were hosted in the AFB was in 1956.” Colonel Amnon acknowledged that “the Greeks are our long-time part-



Photo: US Air Force

During exercise “Iniochos 2017”, a US Air Force officer prepares for a local area orientation flight at Andravida Air Base, Greece, in March 2017. The origin of the exercise dates back to the late 1980's, when it was established as a small scale air warfare exercise with only aircraft of the Hellenic Air Force.

ners and the current exercise is a step forward in our cooperation. The fact that this was a relatively small deployment (total of three squadrons) allowed us to create an intimate training exercise and develop tighter relationships.” Major Dimitrios Gritzaliotis, Commander of the Greek deployment, commented, “I hope to profit from this cooperation in a way that both sides see the scenarios they train for daily and from a different point of view. We expect to continue the cooperation between the two air forces and in the near future host the Israeli aircrews as they did us.”



Logo: HAF

In June 2018, IAF together with HAF conducted a joint exercise over Greek skies, during which long-distance flights and dozens of aircraft in unknown territory were trained with air-to-air refuelling exercises and mutual acquaintance of flight crews. About 40 Israeli fighter planes from 10 fighter squadrons as well as tanker

planes, which never landed during two missions, participated in the exercise. The exercise was part of a series planned for 2018 to improve the operational readiness of the Israeli armed forces.

Joint Exercises

In November 2018, the IAF F-16I fighter jet squadrons returned from a combined training in Greece alongside the HAF. Major Y., a pilot at the 201st Squadron that operates the F-16I aircraft, said that: “We are happy about the cooperation with the HAF.” According to Major I., Head of the IAF's Europe and Asia International Affairs Branch, “the exercise in Greece provided us with the opportunity to fly over expansive terrain, and the tall mountains helped simulate the operational theatre.” An additional advantage in the joint exercise is that Greece, as a member of NATO, operates according to NATO combat doctrines. These doctrines differ from the ones used by the IAF, and this, in turn, provides an opening for mutual learning and exchange of opinions.

In addition to the air force exercises, Greece and Israel conducted a joint naval exercise as early as July 2012. Israeli Navy ships conducted five exercises in the Mirtos Sea. The exercises included firing missiles at the rocky islet of Karavia west of Milos.

In November 2017, three Israeli missile ships and a naval helicopter participated in the Hellenic Navy's autumn 'war games'. The main aim was to provide training in how

Photo: HAF



In June 2018, the IAF and HAF conducted a joint exercise in Greek skies, during which long-distance flights and dozens of aircraft in unknown territory were trained with air-to-air refuelling exercises and mutual acquaintance of flight crews.

to deal with modern maritime threats while conducting evacuations of civilian populations. During the drill Lieutenant Colonel Lavi, Commander of the Israeli delegation, said that "the naval forces carried out advanced training in search and rescue, prevention of maritime terrorist attacks, as well as advanced maritime medical evacuations." This is an indication of the enhanced military cooperation between Israel and Greece in the naval sector and we can expect further naval exercises between the two countries. Alongside Israeli-Greek cooperation, Israel-Cyprus military cooperation has intensified. For instance, in March 2017 Israel participated in a three-day joint military exercise with Cyprus, in the course of which the IAF F-16s were seen in the skies over Paphos International Airport and subsequently tested Cypriot air-defences. A military spokesman of the Greek Cyprus Ministry of Defence said that: "Air and ground forces from both countries took part in the exercise. The drill aimed to maintain the readiness of the forces for any emergency."

In June, more than 500 elite Israeli commandos, supported by attack helicopters and fighter jets, held a three-day intensive drill on Cyprus. The unnamed senior IDF officers said the exercise was the first of its kind and one of the largest exercises by the commandos on foreign soil. It was the largest drill since 2014, when both countries agreed to hold joint exercises as part of their military cooperation.

Cypriot troops also visited Israel for a two-week counter-terrorism training in October 2017 at a mock Arab town at Tzeelim training base.

The aforementioned Israeli-Greek naval exercise in November 2017 was followed by a major military exercise in Cyprus, involving air and ground forces from both countries. The exercise, which is part of the ongoing cooperation between the IDF and the Cypriot military, was pre-planned as part of the Israeli 2017 training programme and is designed to maintain the competence and readiness of its forces. It can, therefore, be said that 2017 marks a turning point in military cooperation between Israel and Cyprus.

In addition, Cyprus conducted three joint exercises in Israel in early 2018, while the IDF conducted military exercises with the Cypriot military in December 2018 and then again in December 2019. During the latter exercise, IDF Chief of General Staff Aviv Kochavi travelled to Cyprus where he met with his Cypriot counterpart, Lieutenant General Ilias Leontaris, Chief of General Staff of the National Guard of the Republic of Cyprus. According to Christoforos Fokaides, the Cypriot Defence Minister, "the aim of the exercise was to improve the operational capabilities of the National Guard by sharing expertise. The Cypriot army was at a good level and had efficient personnel... The exercises were aimed solely at improving the operational capabilities of the National Guard through the exchange of expertise."

The subsequent joint military exercises not only brought the two military forces closer together, but also improved their competence, cooperation and mutual understanding.

From Bilateral to Trilateral Cooperation

In November 2017, the first trilateral defence summit between Israel, Cyprus and Greece took place, which can be considered a milestone in trilateral relations. The defence ministers of all three countries met in Athens and discussed strengthening cooperation to promote maritime and energy security, terrorism, stability and peace in the Eastern Mediterranean. Cyprus Defence Minister Fokaides stated that "Cyprus, Greece and Israel defend in this volatile and fragile region not just their common interests, but also the interests of Europe and, I would say, those of the international community in general." Fokaides added that, "Our vision is to gradually turn the wider region from a conflict zone to an area of peace, stability and cooperation." It seems, however, that Fokaides' vision has only a small chance of being realized at the end of 2019, as Turkey is gradually undermining a peaceful vision, which, according to Turkey, was aimed at marginalising and excluding Turkey in the region. It should be recalled that Israel, Greece and Cyprus are extremely suspicious of Turkey and, as a result, intend to strengthen their cooperation in the military and security field.

Trilateral security cooperation (also known as the Eastern Mediterranean Partnership or EastMed/MEP) encompasses counter-terrorism, counter-proliferation, search-and-rescue, and maritime security. Souda Bay Naval Base in Greece and the UK bases in Cyprus known as Akrotiri, or the Western Sovereign Base Area and Dhekelia Cantonment, or the Eastern Sovereign Base Area (ESBA) are hubs for cooperation in the Eastern Mediterranean.

The Pipeline Project

The growing military cooperation between Israel, Cyprus and Greece is based on the ambitious joint declaration signed by their political leaders in June 2017, which provided for cooperation between the three countries in areas such as energy, the economy, telecommunications, the environment and underseas.

On 2 January 2020, Israel, Greece and Cyprus signed an agreement on a gas pipeline that will transport gas from Israel via Greek Cyprus to Greece and from there to the EU. The main hurdle to be overcome by the three countries is a pipeline route that passes through territorial waters to which Turkey claims to be entitled. Turkey and its new partner Libya have declared a new maritime border in the area, giving

Erdogan a veto right. Tensions between Israel, Greece, Cyprus and Turkey are likely to arise here. It remains to be seen whether or not such tensions will lead to military conflict.

A Radar on Crete

Another spectre for Turkey is the Israeli plan to build an advanced long-range naval radar (known as Long Horizon over-the-horizon (OTH) radar system) on the Greek island of Crete to monitor the route of the planned natural gas pipeline. It is not known what type of Israeli OTH radar system will be used.

The Long Horizon OTH project was first developed during the visit of the Greek Minister of Defence Panos Komnenos to Israel in 2015, but was temporarily suspended due to Greece's deepening financial difficulties. The project, revived in March 2019, would have the capacity to monitor most of Turkey's coasts. The installation of the Long Horizon OTH radar system in Crete, with its extensive coverage area superior to that of traditional radars, would give the three partners a competitive advantage. Apart from its wide radar coverage, the new radar system also gives the missiles new capabilities in terms of target acquisition.

With a series of UAVs, the radar system is capable of monitoring an area with a radius of 600 km. – in other words, the entire region of Cyprus, part of the Aegean Sea extending to the Dardanelles, and the entire Aegean and Mediterranean region of Turkey. With this radar, Israel, Greece and Cyprus can monitor Turkish airspace and the movements of ships in the eastern Mediterranean around the clock. In joint radar station, Israeli experts will carry out the first tasks and Greece will receive data collected by the radar. As soon as Greece's economic circumstances allow, Greece intends to acquire the radar equipment. It is not yet known whether Cyprus will buy the radar or not.

US Support

In March 2019, following a meeting with representatives of Israel, Greece and Cyprus, US Secretary of State Mike Pompeo underscored US support for its trilateral mechanism for better cooperation in the Eastern Mediterranean. The three countries agreed to strengthen regional cooperation and to defend themselves against external threats in the Eastern Mediterranean and wider Middle East. In September 2019, it was reported that a bipartisan bill (known as the Eastern Mediterranean Security and Energy Partnership Act) in the US Congress,



A satellite image of the Aegean Sea. For decades, Greece and Turkey have been arguing over sovereignty and related rights in the Aegean Sea. The dispute has had a major impact on Greek-Turkish relations since the 1970s. On two occasions it led to crises that came close to the outbreak of military conflicts, in 1987 and early 1996.

and ratified by the Senate Foreign Relations Committee, allowed the US to fully support the trilateral partnership of Israel, Greece and Cyprus through energy and defence cooperation initiatives and proposed lifting the long-standing arms embargo on Cyprus. The bipartisan law was adopted on 19 December 2019.

Conclusion

In conclusion, trilateral military cooperation will continue in the coming years. Even if Israel is reluctant to engage militarily on the side of Greece and Cyprus against potential adversaries, the IDF must prepare plans for such action. At the same time, neither Greece nor Cyprus will wage war on Israel's side. Indeed, Israel does not expect its partners to support it militarily, since Israel conducts its wars on its own. It should be stressed, however, that security around the Mediterranean will keep all three countries united for the foreseeable future. Therefore, the implicit support of Israel is indeed crucial for the two countries.

Greece has gradually replaced Turkey as Israel's partner in NATO's multinational air and naval forces and in the naval forces of Israel, Greece and the US Navy. In addition, despite protests from Turkey, Israel is increasingly participating in NATO exercises on the Greek coast. The Israeli-Greek air and sea exercises will continue, providing both sides with additional experience for operations in unknown terrain, whether in Israel or Greece. Israeli-Cypriot military exercises have improved the capabilities and readiness of the Cypriot military compared to the Turkish forces. Turkey has tacitly acknowledged this point. US and EU support for the construction of a gas pipeline from Israel via Greek Cyprus to Greece and from there to the EU puts Turkey under pressure. Whether or not Turkey will seek a military solution is beyond the scope of this article. Nevertheless, it can be said that Turkey will probably consider all the measures at its disposal. ■



Viewpoint from Hamburg

Photo: Ludolf von Löwenstern



Secure Trade at Sea is a Collective Asset

Ludolf Baron von Löwenstern

At the 56th Munich Security Conference, which began on 14 February 2020, the participating heads of state and government as well as more than 100 foreign and defence ministers discussed the disintegration of the West in foreign and security policy under the heading 'Westlessness'. Thus – at long last – an issue, which needs clarification, especially for Germany, has moved into the public interest, namely what security and defence policy must achieve in order to effectively represent the economic interests of Germany and Europe in an age of great power competition. In her keynote speech on foreign and security policy at the Bundeswehr University in Munich, Defence Minister Annegret Kramp-Karrenbauer made it clear that she wants to realign Germany's foreign and security policy in terms of being more responsible, more courageous and, in terms of Germany's role in the world, more appropriate. Germany, she emphasised, had a duty and, as one of the leading industrial and trading nations, had a great interest in protecting the international order – including through military action. Against the background of an increasingly multipolar world, terrorism, the rise and expansion of China and 'America First' with the withdrawal of the US from the world stage, she called for more funds to be available for the Bundeswehr and greater participation in foreign missions as far away as the Indo-Pacific. She also suggest-

ed a National Security Council, which could strengthen geopolitical thinking and create the necessary acceptance in society.

A Setting of the Course

Such a change of course is overdue from an economic and political perspective. After all, the question of what German security and defence policy must be like – in order to effectively serve the economic interests of Germany and Europe in an age of global competition between major powers – has never been answered satisfactorily since the end of the Cold War.

There can hardly be any doubt that Germans in particular must have the greatest interest in the free exchange of goods and secure trade routes. After all, Germany is one of the largest import and export countries in the world. Most of its foreign trade – 95% of global trade in goods and 30% of European traffic – is transported by water. As a country poor in raw materials, Germany has to first bring many things from all over the world in order to refine them here and sell them to global customers. With around 1,400 ships, Germany has the largest container fleet and, with around 3,200 ships, the fourth largest merchant fleet in the world.

For Germany and EU member states, the maritime environment, therefore, plays an important geopolitical and geostrategic role in the geographical, security, economic and cultural sense. In addition, 90% of foreign trade and 40% of EU domestic trade is reliant on maritime transport logistics. 80% of European oil and natural gas production comes from the North, Mediterranean and Adriatic Seas. The geopolitical focus is, therefore, turned towards the maritime area and the EU is thus a global maritime player.

The dependence on free sea routes, the increasing importance of critical infrastructures for energy production and energy sources on the high seas, illegal maritime immigration, illegal arms and drug trafficking, piracy, organised crime, terrorist attacks (for example on ships), oil platforms, port facilities, etc., represent major security and defence policy risks that must be dealt with. Also in the future – at least according to the confessions of those in power – Germany should continue to be one of the engines

Author

Ludolf Baron von Löwenstern is a co-founder of the think tank 'European Strategic Institute', a member of the Economic Council and, as a reserve naval Captain, a Special Representative to the Deputy Chief of the Navy and Commander German of the fleet and support forces. He acts voluntarily, among others, as an expert to the German Maritime Institute, the Alsterdorf Foundation and serves on several company advisory boards. He has written various books, studies, trend reports and articles. He is also a family entrepreneur.

of the global economy. It is often forgotten that this includes the ability to effectively assert one's own interests. Frederick the Great already knew this when he noted: "Diplomacy without weapons is like an orchestra without instruments". Wolfgang Ischinger also put it in a nutshell when he wrote: "You cannot conduct foreign policy without the military. Otherwise, foreign policy is just hot air." The maritime aspects of national and alliance defence are of particular importance here, because the trade routes on the world's oceans are not only the main arteries of globalisation, they also form the basis for growth and prosperity in Germany and Europe.

Maritime security is, therefore, long since been discussed not only in the situation centres of the military or politics, but also on the management floors of internationally operating companies. And terrorist attacks are by no means the only risk. If – as already discussed – 'bottlenecks' such as the Strait of Hormuz, Straits of Malacca or Suez Canal – the most sensitive bottlenecks in the sea route between Europe and Asia, or even the Kiel Canal – become impassable by whatever act, almost every company involved in world trade will be affected – even the LIDL market around the corner. Another idea that robs many an entrepreneur of sleep is that of a radiological weapon, also known as a 'dirty' bomb, which is smuggled into one of the approximately 38 million containers that constantly pass through the world's sea routes and ports. Or the so-called 'asymmetric' or 'hybrid' threats, which include digital espionage and the sabotage of, for example, nuclear reactors or basic medical care.

More Responsibility Means More Safety. Also and Especially for the German Economy

These examples illustrate the increased vulnerability, but also the sheer necessity of a 'Secure Economy', i.e. a security architecture that better protects the German economy, also in maritime terms. In Germany, this protection is the task of the Navy – provided that it has sufficient ships, personnel, equipment and materials. In addition, the political mandate to protect maritime trade routes must be clearly defined operationally (the primacy of politics). Unfortunately, however, this is not the case either. For example, according to the current constitutional situation, the Navy is not entitled to intervene in the event of danger from international terrorism without a corresponding mandate, neither on its own coastal apron nor in the global area, as the prevailing legal opinion is that this is a 'police task'. Germany, therefore, urgently needs a national security concept, which also and above all clearly regulates the role of the Navy in protecting maritime trade routes.

Five Major Regions: USA, China, Russia, India and the Europeans!

World politics is also maritime politics, and the German Navy contributes its share to global prevention and crisis management. As the German Navy cannot manage the protection of sea routes alone, it usually operates in cooperation with other NATO navies and partners. This is why we need a Europe that is

capable of taking action in the field of security policy on the basis of a European defence and security concept that does not remain a political declaration of intent but is implemented in concrete terms in order to be prepared for the threats and dangers of the 'new age'. The US accusation that Germans and Europeans are merely 'free riders' of US military strength cannot completely be dismissed.

So, if EU member states – the second largest economic area in the world with over 500 million people – were to expand their capabilities for securing the sea routes and undertake this in co-operation within the framework of a common security concept, they would show that they were living up to their responsibilities. The EU also needs a global political vision and a long-term geostrategic perspective as an independent alternative between 'Americanisation' and the Chinese dream in order to gain acceptance on the international stage and, above all, to defend its own interests. All of this also against the background that we

Photo: NASA



The Gulf of Oman with the Strait of Hormuz, here photographed at night from the International Space Station, is one of the world's most sensitive choke points.

are tending towards a world order in which there is no longer a guardian, but rather five metropolitan areas: USA, China, Russia, India and the Europeans!

We live in volatile and demanding times when it comes to defence policy. The security environment that we believe to take advantage of is only a virtual one. That makes it all the more important that EU member states should now take responsibility and finally expand their ability to safeguard German economic interests within the framework of a common security concept. They finally owe this to the business community but also to their citizens. Certainly the 56th Munich Security Conference offers the opportunity for governments to discuss such a concept.

How Much Has Russia Militarised the Crimea?

Georg Mader

At the sidelines of the January meeting of the Forum for Security Co-operation (FCS) of the Vienna-based OSCE (Organisation for Security Co-operation in Europe), a document has been circulating that illustrates the rapid growth of Russian units and weapon systems on the annexed Crimean Peninsula. ESD has obtained the 20-page document but has been unable to verify its authorship.

Regardless of how accurate the numbers are, it shows how Russia, in violation of international treaties, has transformed this once thriving resort into a modern military base and even prepared it for the deployment of nuclear weapons. It is assumed that the latter in particular are meant when the document states that Russia continues to station various weapons systems, equipment, and ammunition on the occupied territory in flagrant violation of relevant international legal obligations.

In 2020, the Joint Task Force (JTF) of the Russian armed forces in occupied Crimea consists of 31,500 soldiers - considerably more than before the occupation of Crimea (which were there mainly because of the Russian Black Sea Fleet). The source estimates that the number of Russian troops will increase 1.5 times by 2025. Russian troops are made up of three main components - land, air and naval forces, which allows Moscow to conduct comprehensive military operations, in the southwest, the sea and coastal areas, the airspace over the Azov and Black Seas, and down to the Mediterranean.

Anti-Access / Area Denial Tools

These terms may have become a military fashion, but in this case they adequately describe how Russia wants to keep com-

Graphics: via author



Russian units and weapon systems on the annexed Crimean Peninsula have increased significantly.

petitors or potential opponents away from Crimea. The Russian occupation forces have created a multi-stage anti-aircraft/ missile system over and around the peninsula. To increase its efficiency, Russia has upgraded its ground-based air defence regiments with the new S-400 TRIUMF systems and plans to supply other units with medium-range systems of the type BUK-2, TOR-2 and PANTSIR. These systems will also increase combat capabilities up to 300 to 400 km to reach targets outside the Crimea, including southern Ukraine. Since December 2018, they are reportedly supported by the deployment of the BASTION-P 3K55 anti-ship missile systems and the BAL 3K60 anti-ship cruise missile. The latter are stationed about 10 km inland and are also reported to be deployed near the Kerch Strait and around the newly built Russian bridge to the Crimea. The bridge has been criticised as a unilateral step and as a breach of international maritime law, as it restricts maritime traffic to and from the Sea of Azov by limiting the passage

of ships to a height of 35, a width of 31 and a draught of 8 metres.

Following protracted negotiations, Russia has released the crews of the Ukrainian naval tugboat JANA KAPU and two small armoured artillery boats that were rammed and detained on their way to the Ukrainian port of Mariupol in November 2018. According to Ukrainian diplomatic staff, Russia also returned the three ships but they were completely devastated inside, with all the instrumentation and electronic equipment of the bridges torn out - right down to the toilets and faucets. This chapter of the document concludes with assessments of how the Russian side might easily increase its Crimea-based combat capabilities in a possible future conflict by deploying its tactical SRBM systems ISKANDER and ship-based KALIBR SS-N-27 cruise missiles of the type SS-N-27 with a range of up to 1500 km. 25 RN ships and submarines will receive KALIBR until 2025. Also mentioned are some "special warheads" having a range of 2600 km.

Author

Georg Mader is a defence correspondent and freelance aerospace journalist based in Vienna, Austria, and a regular contributor to ESD.

Nuclear Weapons

The document claims that there is evidence that air and sea-based means of delivering nuclear weapons have been moved from Russia to Crimea, while the old Soviet-era storage infrastructure near Feodosiya and Sevastopol are allegedly being renovated. Corresponding sheets point to the facilities "Property 76" (Feodosija 13) as well as "Property" -100, 221 and 825, and the Baherove airfield near Kerch.

It should be recalled that the Russian Federation unilaterally denounced the 1997 Agreement with Ukraine on the status of the Black Sea Fleet. According to Article 5 of this Agreement, "the Russian Federation undertakes not to possess nuclear weapons in the Black Sea Fleet of the Russian Federation stationed on the territory of Ukraine". Moscow may now stress that Crimea is no longer part of Ukraine. Nevertheless, given the geopolitical location of Crimea, the deployment of nuclear forces there is a serious challenge to the international non-proliferation regime and should receive an appropriate response from the international community. The document criticises the lack of such an answer.



By deploying its units to Crimea, Russia has dramatically increased the range of its missile systems.

Russia has already deployed various carrier-systems and other means capable to deliver nuclear weapons to Crimea. Among them are the cruiser MOSKVA with its VULKAN missile-system, the

guided missile escort ship SMETLIVY with the launch system RASTRUB-B, and a Su-24M bomber unit which can carry tactical nukes. Other VKS aviation assets who already have deployed to Crimea

Scan the QR code



ARMS AND SECURITY

XVII INTERNATIONAL EXHIBITION

October 13-16, 2020



General Information
Partner



General Media
Partner



Technical
Partner



INTERNATIONAL EXHIBITION CENTRE
Ukraine, Kyiv, Brovarskyi Ave, 15
Livoberezhna underground station

☎ +38 (044) 201-11-63
✉ zbroya@iec-expo.com.ua
www.iec-expo.com.ua

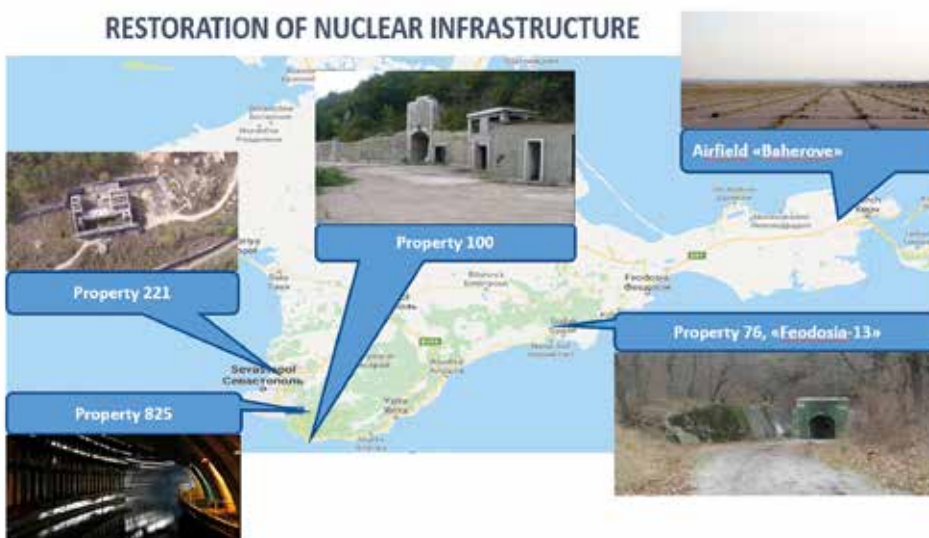


of troops to the Crimea, almost 100 units and organisations have been created. According to Shoigu, "By order of the President, we have been instructed to station a self-sufficient combined force group in Crimea, capable of effectively protecting Russia's interests in the area. This task was accomplished. A report to that effect was submitted to the commander-in-chief. 96 units and organisations were formed. In addition, we have now organised the complete combat training of the Crimean Group Air Force, the operational strength of the air defence forces has been increased. The construction of new facilities in five military towns on the peninsula is also continuing, and other buildings are undergoing repairs."

In January 2020, Russian President Vladimir Putin observed on television a massive military exercise off the coast of the disputed Crimea. While on board the RN cruiser MARSHAL USTINOV the commander-in-chief observed the KALIBR cruise launched by ships and two MiG-31K launched KINZHAL hypersonic missiles heading for their distant training targets.

Disappointment among Crimean Citizens

When Russia is criticised for its civilian and military actions in Crimea, it repeatedly points to the - internationally unrecognised - plebiscite of March 2014, according to which 96% of the 83% of Crimea's inhabitants voted in favour of joining Russia. Without naming any sources, the document now quotes surveys from November 2019, according to which 65.8% of Crimean citizens and 67.3% of citizens of Sevastopol would be dissatisfied with their economic and general living conditions. For example, 82.2% of respondents are dissatisfied with the increase in prices of goods and services in Crimea. 66.0% of respondents said that they are dissatisfied with low incomes. As for medical services, almost the same figures can be observed throughout Crimea - 45.8% and -49.5% in the city of Sevastopol. 44.8% of respondents said that corruption and bribery are the main problems in Crimea, while 24% of respondents described these two phenomena as the worst in the city of Sevastopol. In general, an increase in the prices of goods and services, low income levels, insufficient medicine, and corruption and bribery are cited as key problems in everyday life on the peninsula. And 31.3% and 26.3% of respondents respectively said that the situation had only worsened between June and November 2019.



for training purposes included Tu-22M3 medium-range bombers and Su-34 tactical long-range strikers.

The document also refers to experts who claim that Russia will resume operation of the research reactor "DR-100" with low-enriched uranium (LEU) of the National University of Nuclear Energy and Industry in Sevastopol. It is noted that Russia's attempts to take control of nuclear facilities and materials in the Crimean Peninsula are contrary to international law and the IAEA Statute and pose a serious threat to the international non-proliferation regime.

No Russian Denial

Officially, Russia has never commented on its nuclear activities in Crimea, but it does not hide its conventional reconstruction efforts. A 2018 TASS publication referred to a statement by Defence Minister Sergey Shoigu: "The Crimean troop force was established not only to defend Russia's interests on the peninsula and in the Crimean Federal District, but is also capable of performing tasks in the Black Sea offshore zone." As the Minister noted, after 2014, as part of a program to send a self-sufficient group



Viewpoint from Edinburgh



Photo: John Cooke

The UK no more?

John Cooke

If it taught us anything, December's UK General Election confirmed that Scotland and England are on increasingly divergent paths.

In England, Boris Johnson's pro-Brexit Conservative Party swept the board, capturing previous Labour strongholds such as Bolsover. For those not intimately familiar with UK politics, that constituency voting Conservative was about as surprising as San Marino beating Germany at football. In Scotland, however, Nicola Sturgeon's pro-EU Scottish National Party (SNP) made spectacular gains, winning 48 out of 59 Scottish seats.

Does this make Scottish Independence inevitable? Perhaps. Support for it is certainly growing, with three recent opinion polls showing a narrow majority in favour of independence. But for now, the debate has shifted to a subtler question, namely 'who has the right to hold a referendum on Scottish independence?'

Nicola Sturgeon wants another independence referendum this year. But her ultimate goal is not simply a referendum, nor even victory in such a referendum, but rather independence. The latter, she argues, requires any vote for independence to be beyond legal challenge, and be recognised by the international community. So she doesn't want to hold an 'advisory' referendum, which could be boycotted by her opponents. Instead, she wants the same arrangement as in 2014, where the UK Government grants Scotland a 'Section 30 Order', allowing a referendum. That's because UK law reserves constitutional matters to the UK Parliament, meaning that, at least in theory, the Scottish Parliament could not hold a binding referendum on independence without London's consent. And Nicola Sturgeon's problem is that Boris Johnson has just refused her request for a Section 30 Order.

Divergent Paths

His supporters say one should not be granted for decades, citing a remark by the then SNP Leader, Alex Salmond, in 2014, that the

referendum was a 'once in a generation opportunity'. In response, independence supporters point both to December's UK election result, and to the SNP's 2016 Scottish election manifesto, which promised another referendum 'if Scotland were dragged out of the EU against her will.'

Some senior figures in the SNP, such as Joanna Cherry, a lawyer, and Member of the UK Parliament, are suggesting that one way to get round this problem would be legal action: the requirement for the UK Government to agree to an independence referendum has never been tested in the courts. While the outcome is open to doubt, not least because the UK does not have a written constitution, many lawyers suggest that the UK Supreme Court would probably rule in favour of the UK Government in such a case, because the provision is in an Act of Parliament, and in English Law, Parliament is sovereign. International law is a different matter. The right to self-determination is enshrined in the UN Charter. And in its judgement on Kosovo, the International Court of Justice (ICJ) ruled that the agreement of the state being seceded from was not necessary for independence. In its own submission to the ICJ in that case, the UK Government made precisely that point, saying also that in most cases, countries gaining independence have not complied with the law of the states that they were leaving. So if Scotland's right to hold a referendum without London's permission did come to an international court and was contested by the UK Government, the latter would, embarrassingly, have to argue the exact opposite of its position on Kosovo. And the ICJ's decision in the Kosovo case is hardly surprising: the right to self-determination isn't self-determination if you have to ask another country to exercise that right.

No court case has yet begun, but it may be the SNP Government's best option. Many of its own supporters are already restless at what they perceive as a lack of urgency in securing another referendum. They will become more so if its only tactic is repeatedly to ask London for Section 30 Order, only repeatedly to be rebuffed.

CBRN Hazards to the Natural Environment

Dan Kaszeta

CBRN threats to the natural environment are rarely addressed and countermeasures are rarely thought about. This article is a study of the landscape of the threat.

The large majority of CBRN-related articles in this magazine cover technologies and solutions to problems. Indeed, some products in the CBRN space are, in effect, solutions looking for a problem. Many segments, such as detection and individual

The general thinking in military CBRN circles regards CBRN hazards as threats of injury or death to military personnel, as threats of contamination to equipment and key terrain, and as a general threat of degradation of military capability. Dam-

ronment is minimal compared to protecting people. Given limited budgets, it is hard to fault such decisions.

Major Radiological Incidents

The largest examples of CBRN threats to the natural environment in the last few decades have been major releases of radioactive material due to accidents at nuclear reactors. Nuclear reactors, while generally quite safe, contain a wide variety of radioisotopes of varying degrees of danger and longevity. Some contents of a nuclear reactor, like Cesium 137, are both highly radioactive and have relatively long half-lives. Cesium 137's half-life is slightly more than 30 years. Others have shorter half-lives but are potential health threats because they are easily absorbed by humans or other animals. Radioactive isotopes of iodine can be absorbed into thyroids, or into many types of plants. Strontium can mimic calcium and end up in milk and bones. All of these have proven to be at least theoretical problems after major nuclear incidents.

The International Atomic Energy Agency (IAEA) has developed a grading scale for nuclear disasters, the International Nuclear and Radiological Event Scale (INES). IAEA's INES scale ranges from 1 (anomaly) to 7 – major accident with widespread consequences including damage to the environment. To date, there have only been two INES 7 events – Chernobyl and Fukushima. The Chernobyl disaster saw much loss of human life, both directly and in terms of lifespans cut short by radiation-related illnesses. It also saw widespread property damage, including the abandonment of entire towns and villages. The exclusion zone is still enforced, over thirty years after the incident. It should be noted that the environmental situation in the Chernobyl exclusion zone is not entirely bad. The near complete curtailment of human activity has led to significant re-wilding of the area. The phenomenon of nature taking over where human effort has ceased is as much a valid subject of study as the long-term environmental damage.



Photo: Julian Nyca

How do we protect our crops from a chemical attack?

protective equipment, have fundamentally solved the basic problems and have long since graduated into a long phase where they are working on small incremental improvements. However, there are areas which are the opposite – threats and problems that have very few solutions available at present. One of these areas is the CBRN threat to the natural environment and natural resources. Unfortunately, this is an aspect of the CBRN threat that is rarely addressed in a methodical manner. Countermeasures are rarely thought about, for reasons that will be explained below. Therefore, this article will have to be more of a study of the landscape of the threat, rather than a traditional survey of products and technologies.

age to civilian property or the environment rarely rates in military CBRN thinking, except perhaps in terms of possible contamination of water supplies or transportation routes.

Civilian Emergency Response

Civilian emergency response thinking in the CBRN arena places somewhat higher emphasis on CBRN threats to the environment, but the overall emphasis is still rightly on protection of people followed by protection of property. Protection of the environment becomes a distant third in operational priorities. However, as normal human life requires use of natural resources, CBRN incidents that damage or contaminate the natural environment can end up posing threats to human health and safety, especially through things like contamination of the food chain, water, or even building materials. Time, resources, expenditures, and research effort spent on protecting natural resources and the envi-

Author

Dan Kaszeta is Managing Director at Strongpoint Security Ltd. and a regular contributor to ESD.



Photo: Julian Nyca

The Bhopal disaster was a gas leak incident on 2 December 1984 at the Union Carbide pesticide plant in Bhopal, India. It is considered to be the world's worst industrial disaster. Over 500,000 people were exposed to a highly toxic substance, killing thousands of people.

The more recent Fukushima nuclear disaster in Japan is a somewhat different example. Actual loss of life from radiation was quite low, especially given the concurrent earthquakes and tsunamis which killed many. One thing was quickly apparent in the aftermath of the Fukushima incident. There was far more data available in the months after the incident. Vast amounts of data, much of it from private individuals posting their own radiation sensor data, was made available on the internet. The national government and many regional and local governments monitored air, water, plants, and food. The widespread availability of reliable radiation data meant that the overall phenomenon could be studied. A large body of knowledge about how radioactive fallout from such an incident is now available to modern science. This knowledge will help in the event of a future incident. A broad conclusion that could be drawn is that the Fukushima incident did result in widespread issues with agriculture and water, but that through aggressive monitoring, the size and scope of the problem can be ascertained.

It should be noted that there have been other serious radiological incidents of somewhat lesser scope. For example, the little-known 1957 Kyshtym nuclear disaster in Russia, long suppressed by secrecy rules in the Soviet era (INES level 6), entailed a serious release of nuclear materials. A 16,600-hectare area of remote countryside was effectively quarantined for decades, under the guise of making it into a nature

reserve. It is still off limits to the general population. The 1957 Windscale nuclear plant fire in Cumbria, in the North of England, resulted in a month's milk production in the local area being impounded and disposed of.

Nuclear Weapons Testing

The IAEA INES system only refers to accidents. It does not refer to deliberate testing of nuclear weapons. Although it has been many decades since the world generally abandoned above-ground nuclear testing, there have been numerous underground nuclear tests. Although most countries have ceased such activity, it still continues in North Korea, with a test as recent as 2017. It has been clearly established from studies in Nevada, USA, that underground nuclear tests result in radioactive isotopes migrating into groundwater.

Former CBRN Industrial Complexes

The history of the production of chemical warfare agents and chemical munitions has been fraught with health and safety problems. There have been a number of environmental problems associated with various large state-level manufacturing efforts for chemical weapons. The very first nerve agent factory, the Third Reich's secret factory at Dyhernfurth in Silesia, dumped many tons of the nerve agent TABUN into the Oder river in early 1945. There was an infamous incident near Volgograd in the

USSR in the early 1960. Waste chemicals leaked from the "Beketovka" SARIN factory and caused an incident known locally as the "White Sea", where millions of fish were killed. Poor waste handling at the US Army's chemical warfare agent plant in Colorado led to extensive contamination of water and soil. Indeed, much of what we know about the history of the US chemical weapons effort comes from documents released due to environmental litigation. The exact extent of contamination to the environment in places like Russia, China, Iraq, and Syria (to name but a few) due to chemical weapons manufacturing or testing is poorly defined.

Old Chemical Munitions in the Ground

The environmental legacy of old CBRN weapons programmes is not limited to the environmental disasters left by industrial efforts. Active chemical warfare from 1915 onwards has left a legacy of unexploded bombs and shells containing chemical warfare agents. Historically, chemical artillery shells often had a poor reputation for duds, so the chemical battlefields of the past. In addition, some chemical munitions were hastily abandoned during or after battles.

First World War chemical munitions have been recovered almost every year since 1918 along the footprint of the old Western Front. Munitions have occasionally turned up on other fronts, in places like Northwest Italy and Poland. This author met with Estonian technicians who had discovered old German chemical weapons in Estonia in the early 2000s. Some turned up in a residential neighbourhood in Washington, DC in the mid-1990s. Rumours of chemical munitions in Morocco from the 1920s Rif War remain unconfirmed, but Italy has had to act to deal with recovered munitions in Ethiopia several times over the decades.

While it is not often discussed in broader considerations of the Second World War, there was significant use of chemical weapons by Japan against China. At the end of the war, literally hundreds of thousands (and possibly more) chemical bombs and shells were abandoned, mostly in Manchuria. Numerous incidents in the following decades caused injury, death, and environmental damage. The entire issue of abandoned chemical weapons features as its own entire strand of China-Japan bilateral relationships. A 1997 study showed that many Japanese munitions pose a hazard to municipal water supplies. Some of these contain Lewisite, which degrades into various arsenic compounds that can contaminate ground and water for decades. More recently,

Photo: Tim Porter



After the Chernobyl disaster, the reactor building was encased by a mammoth concrete sarcophagus which, in turn, has been supplemented by a “New Safe Confinement” in 2017.

China is not the only example. In recent years, Albania discovered an inventory of Mustard gas left over from a secret programme during its decades of communist rule. More recent conflicts, such as the Iran-Iraq conflict and the ongoing civil war in Syria, pose the possibility of further environmental problems from old munitions. The Chemical Weapons Convention (CWC) levies serious responsibilities on its member states to account for and safely recover and demilitarise old munitions wherever possible.

Old Chemical Munitions in the Sea

By far the largest inventory of old chemical weapons still in existence are old stockpiles of chemical munitions that were disposed of in the world's oceans. Serious dumping operations happened in the North Atlantic, Baltic Sea, and Irish Sea, although disposal operations occurred elsewhere as well. A 2017 study by the USA-based James Martin Center for Nonproliferation Studies documented 224 confirmed or suspected dumping sites. Many thousands of tonnes of chemical agents were disposed of at sea. Nobody really knows the full extent, as records are incomplete. There are also significant discrepancies in what records do exist, as some record agent tonnage (amount of chemical warfare agent), others report munition tonnage (the actual weight of the whole shell or bomb or rocket), and yet others conflate conventional munitions with chemical ones. Significant amounts of conventional munitions were disposed of concurrent with chemical munitions.

This dumping happened for reasons that were largely logical at the time, particularly since environmental considerations were not always prevalent until the 1960s or later. The majority of chemical munitions produced since the First World War were made with a view towards being used, not safely dismantled. At the time of their design, there was usually little consideration as to how to safely dispose of such weapons. The two World Wars, as well as the Cold War, left large stockpiles of chemical weapons. While few at the time thought that dropping weapons into the sea was ideal, it was the least unsafe disposal option available at the time. Disposal at sea tapered off in the 1970s as other demilitarisation options became more technically feasible and environmental concerns became more prominent.

A large portion of these munitions were dropped into the sea on ships sunk in deep locations. Some, such as US Army SARIN rockets, were cast inside concrete slabs before being put on old merchant ships and sunk in several thousand metres of water. Others are in more shallow locations. Sunk munitions pose numerous problems, as fishing, underwater cables, and pipelines could disrupt them. Munitions will eventually leak. Some of the chemical agents are highly reactive with water and will degrade into other things. Some will persist for a very long time. There is some serious question as to what can be done about this vast underwater inventory. At present, the basic consensus is not much more advanced than the decision processes that led to the weapons being dumped into the sea. Leaving the munitions where they are and not

touching them is likely to be the safest and most cost-effective course of action for decades to come.

Threats to Wildlife, Plants, Livestock, and Agriculture

CBRN materials can be injurious to wildlife and livestock animals. Problems can manifest themselves as acute issues subsequent to an accident or incident. A US chemical weapons test gone wrong killed thousands of sheep in Utah in the late 1960s in the so-called “Skull Valley Incident”. In this case, it was a deliberate release of the nerve agent VX for testing purposes, but the wind shifted unexpectedly. Problems can also result from chronic exposure to historical contamination over a long period of time. Wild badgers have been found ill and dead near Rocky Mountain Arsenal in Colorado, where they appear to have been exposed to trace levels of waste left over from manufacturing activities at that chemical warfare industrial site. As a practical matter, we know more about these sorts of incidents in the USA than other places, due to greater transparency. However, China occasionally reports livestock-related incidents due to discovered Japanese chemical munitions. Similarly, various incidents have affected plants and crops. It should also be noted that contamination of trees is of concern, not just out of general concern for the environment, but also because of the use of forestry products for wood and construction

Water Supply Contamination

Water is the most fundamental of all natural resources and the root of all industry and commerce. Major incidents have caused actual contamination of water from groundwater, the sea, rivers, or lakes. This is perhaps the one area where military CBRN operations take the threat seriously. Militaries run on water as much as food, fuel, and ammunition. Military CBRN detection equipment designed to test for the presence of chemical warfare agents or radiological particles have been around for decades. CBRN filtration requirements are now fairly standard features of military water purification systems in the world's major militaries, as discussed in this magazine last year. Some consideration has been given to threats to civilian water supplies, either due to terrorism or warfare. This has been generally part of a broader approach to consider threats to critical infrastructure as a whole. Some European Union projects have occurred in this space. One, SAFEWATER, was an EU FP7 project that ran from



Photo: Digital Globe

The Fukushima Nuclear Power Plant 2011 immediately after the 2011 tsunami

2013 to 2016, with modest results. Several smaller projects in this area have also been funded as part of FP7 or Horizon 2020. This is clearly a space where EU funding could make a difference if properly applied.

Agriculture as a Target

Finally, it is important to mention that deliberate targeting of agriculture has

long been considered a strategic biological warfare threat. Indeed, the US biological warfare programme, before it was disbanded, placed a strong emphasis on anti-agricultural biological agents, such as fungi. Various crops such as wheat and rice were targeted and field tests were quite successful. It is possible that countries like Syria and North Korea, long suspected of having offensive biological

warfare programmes, have experimented with anti-crop agents.

Future Prospects

This article reads more like a catalogue of deficiencies and threats than a survey of capabilities and product. For now, protection of military personnel and the civilian populace from injury or death takes the highest priority in CBRN. Protection of equipment and property takes a second place in the queue for funding and emphasis. The various threats to natural resources and the environment tend to only get major attention after a major incident. Interest (and funding) tends to wane in the years after an incident. However, it is not all doom. The incidents that have happened, as well as incidents unrelated to CBRN that have similar stresses and effects (such as natural disasters affecting water supplies) have provided a lot of knowledge. Incidents like Fukushima give us a wealth of data as to how once theoretical threats actually behave in the real world. At the end of the day, though, this is a segment of the threat that deserves a higher degree of care and attention, both from military and civil authorities. ■

INTELLIGENCE FOR THE INTELLIGENT

European Security & Defence

- Politics
- Armed Forces
- Procurement
- Technology

EUROPEAN SECURITY & DEFENCE is a specialist magazine tracking events and developments in the defence and security arena. One of the magazine's objectives is to describe, explain and interpret European and transatlantic security policy – which extends far beyond conventional defence with military forces – in all its complex and sophisticated correlations.

EUROPEAN SECURITY & DEFENCE provides answers to questions on international affairs, business, technology and defence/security matters. Our analysis is based on neutral and in-depth investigation.

The primary mission of **EUROPEAN SECURITY & DEFENCE**, both in print and online, and including the daughter publication **ESD SPOTLIGHT**, is to convey information and influence within the European theatre, to and from decision makers at all levels in the security and defence arenas.



ESD – for the step beyond thought leadership

Save over 30%!

→ Annual Subscription Rate:

€ 64.90 (International)

(print format;
postage included)

Annual subscription includes
at least 11 issues.

Test EUROPEAN SECURITY & DEFENCE and order a free copy now!

Mittler Report Verlag GmbH – Subscription/Reader Service

PressUp GmbH · Postfach 70 13 11 · D-22013 Hamburg

Phone: +49 40 38 66 66-319 · Fax: +49 38 66 66-299 · mittler-report@pressup.de

www.euro-sd.com

“The international strategic scenario is complex and uncertain.”



Photo/Logo: Armada Española

Spain stands by its commitments to NATO and the EU. The Spanish Navy currently has a permanent presence in the Euro-Atlantic, Mediterranean, Indian Ocean and Gulf of Guinea. In addition, the Spanish Navy participates in NATO operations, which also take its ships to the Baltic Sea, the Horn of Africa, and Libyan coast. To meet these challenges, the Navy must keep pace with new developments. In this context, ESD had the opportunity to speak to Admiral Teodoro Lopez Calderón, Chief of the Spanish Navy.

ESD: What is the current situation of the new F-110 frigate programme? When do you expect them to be in service?

Admiral Lopez: The programme envisions the shipbuilding of five units and is currently in the final stage of the detailed design. The actual construction is expected to start at the end of 2020 or the beginning of 2021 at the latest. The frigates will be gradually delivered between 2026 and 2030. Once delivered, each ship will then require a year of endurance tests and sea trials. Regarding deadlines and taking into account the shipyard's experience, no delays are expected. To mitigate the possible development of risks, a significant investment has been made with the most advanced systems, which will allow testing of certain equipment in ground facilities to warrant their successful operation before being installed on board.

ESD: What kind of characteristics will this new type of Spanish frigate have?

Admiral Lopez: The F-110s are designed to handle a wide range of military missions in all kinds of scenarios. In addition, they will have a large and flexible multi-mission bay to face the different types of tasks that may arise, such as participation in rescue missions in

case of natural disasters.

The ships maintain the great air detection capability enjoyed by the F-100s due to a new S-band radar that uses solid-state technology resulting from the fruitful cooperation between Indra and Lockheed Martin. Moreover, they will have an important ASW capability due to their hull-mounted and towed array sonars, along with an acoustic process system for the sonobuoys.

This project is being developed implementing the European 4.0 industry framework. One of the most innovative aspects is the transformation of the existing process to the digital world, focused on the so-called 'Digital Twin', which helps converge physical reality and cybernetics in all areas.

Included in this process are the systems, procedures and people, so that all elements have their corresponding 'digital twin'. This will mean the possibility of access to any on-board system in real time with added advantages, such as the implementation of Artificial Intelligence for the optimization of predictive maintenance techniques. In other words, actions can be taken before the actual failure or breakdown occurs, resulting in obvious savings.



ESD: And the S80-class submarine? Are all the problems solved? When do you expect the four units to be in service?

Admiral Lopez: The design problems have already been solved and the programme is making good progress as regards the final shipbuilding and integration stages of the first unit, with

its hull expected to be completely assembled before the end of this year, and launching scheduled for 2020.

This is a project that has been a great challenge for the Spanish shipbuilding industry. Our country has become one of the few countries in the world with the capability to design and build its own submarines.

The delivery date of the first submarine of the series, the S-81 ISAAC PERAL, has been scheduled for September 2022, and the remaining three units will be successfully delivered by 2027.

ESD: What is the Spanish Navy looking for with this type of submarine from the operational point of view?

Admiral Lopez: Once the S-80 class submarines come into service, we will have one of the most advanced conventional submarines in the world, one which will provide the Spanish Navy with the new capabilities that it currently lacks.

As for the projection of naval power ashore, the S-80 will decisively contribute to the 'Deep Strike' task of the Naval Force, with ground attack missiles that ensure the deterrent element of the Force, even if complete air and sea control has not been attained.

In relation to Special Naval Warfare, the projection capability of Special Operations groups will likewise significantly improve.

Regarding the protection of a Naval Force, the submarines will contribute to achieving sea control of the theatre of operations, facilitating the arrival of a Naval Force to the area. They will also help the Force's ASUW defence with their missile and torpedo capabilities, and the ASW through its detection systems and weapons. Likewise, this submarine will have the capability to conduct CSAR operations and discrete evacuation of personnel, as well as perform covert offensive mine-laying missions.

All those capabilities will be enhanced thanks to the new Air Independent Propulsion (AIP) system, which will allow the S-80 to remain submerged in deep waters for around 15 days, depending on the tactical use made of it by the commanding officer.

ESD: The Spanish Navy Aviation will need to replace the AV-8B HARRIER II in the forthcoming years. What is the solution Armada Española is looking for? Are you negotiating with Lockheed Martin to get F-35B as the replacement?

Admiral Lopez: The replacement of the AV-8B must be in service with the Spanish



Photo: US Navy

A Spanish Navy AV-8B HARRIER taking off from an aircraft carrier

Navy by 2027. The F-35B is the only short take-off and vertical landing aircraft available and, therefore, the only aircraft capable of operating from the LHD JUAN CARLOS I. Consequently, the Spanish Navy anticipates that the F-35B will be the selected replacement of the AV-8B. Contact has already been made with LM and the US Navy International Programmes Office to study the viability of this option, either through a joint Spanish Air Force-Navy programme, or through a specific naval programme.

ESD: What are the immediate needs Armada Española will face in the short and medium term?

Admiral Lopez: In the short term, we need to replace our tactical and transport

helicopters. The objective is to reduce the number of different helicopter models, currently four, to only two versions and be more efficient as regards maintenance. For this reason, over the next decade we will procure the NH90 in two different versions: transport and tactical (ASW and ASUW). In the meantime, and until they become operational, several US SH60F helicopters have been procured as an interim solution.

Another requirement is to continue with the offshore patrol vessel programme (BAM) in different configurations. The most urgent needs are the BAM-IS (for underwater interventions, support for diving operations, and search and rescue of submarines) and the replacement of hydrographic vessels.

Another 'must' is the widespread use of unmanned vehicles, especially submarines and surface UVs.

Finally, in the medium term, the replacement of minehunters and logistic support vessels are also a priority.

ESD: Are you worried about the delay of the naval version of the NH-90 helicopters?

Admiral Lopez: The programme of the naval version of the NH-90 helicopter introduces a high technological component, which is essential to satisfy the operational requirements of the Spanish Navy. It is important to underline that, according to the Spanish Navy tactical procedures currently in force, a naval helicopter is not only an air platform on board the ship, but also a real extension of its sensors and weapon systems, which are fully integrated into the ship's combat system from which it operates.



Photo: US Navy

A port bow view of the Spanish Navy frigate ALMIRANTE JUAN DE BORBON underway in the Pacific Ocean during combat system qualification trials

We are, therefore, aware that this requirement makes the Spanish naval version of the NH-90 helicopter a much more complex option than those chosen by other European navies. This entails risks that will have to be mitigated with appropriate feasibility studies.

In any case, the expected delivery times will allow us to take the necessary steps to maintain the current capabilities until

our indigenous combat system, platform control and cyber-defence systems.

ESD: How do you envision the navies of the future? What kind of new roles should they be prepared for?

Admiral Lopez: The international strategic scenario is complex and uncertain, with blurred boundaries, already anticipated in the so-called 'hybrid and asym-

influence and, in short, enjoying an expeditionary capability as well as the possibility of projecting the naval power ashore.

ESD: Last year, the naval base of Rota was selected a new strategic HQ for the EU. What kind of missions have been deployed since 2014?

Admiral Lopez: Indeed, an EU OHQ was set up in Rota Naval Base in 2018 as a strategic HQ. In addition, and as of March 2019, this EU OHQ manages and controls Operation 'Atalanta'. Through this operation, the EU has been fighting piracy in the Horn of Africa and the Indian Ocean since 2008, providing protection to UN 'World Food Programme' vessels, fighting illegal fishing in the area and supporting other missions within the framework of the EU's comprehensive approach in the area.

This OHQ is currently under the command of Marine Corps Major General Antonio Planells, who, in turn, is dependent on the EU's Political and Security Committee. It goes without saying that the Spanish Navy guarantees the necessary logistic support, both in regard to facilities and personnel.

Apart from Operation 'Atalanta', the Spanish Navy has deployed several units in the EU-led Operation 'Sophia' since 2015 to fight human trafficking in the central Mediterranean, contributing with different assets to the EUNAVFOR MED Naval Force.

As regards training missions, the Spanish Navy is currently participating, as of January 2018, in Mali (EUTM MALI), with two Marine Corps' Force Protection platoons, as well as with other significant contributions to the HQ, depending on the requirements of the scheduled rotations.

ESD: What is the relationship with the US Navy in the Spanish Naval Station where four ARLEIGH BURKE class destroyers are deployed since 2014?

Admiral Lopez: The presence of US Armed Forces in Rota Naval Base dates back to 1953 after a bilateral agreement was signed between Spain and the US that same year. Since then, a close and fluid relationship of common support and cooperation between the Spanish Navy and US forces has been maintained with mutual benefit to both sides. Following Spain's entry into NATO, initiatives between Spain and the US have been developed to improve and increase the level of cooperation, adapting this cooperation to the new circumstances. A highlight of these initiatives was the Defence Coopera-



Photo: US Navy / Scott Hallford

The Spanish Navy training vessel JUAN SEBASTIAN DE ELCANO renders a 21-gun salute as the ship passes Naval Air Station Pensacola on its way to the Port of Pensacola.

the final commissioning of the different versions of the NH-90 helicopter.

ESD: The Spanish Navy is closely linked with the national Navantia shipyard. How important is that relationship?

Admiral Lopez: The historical relationship with Navantia for more than 50 years has resulted in a successful shipbuilding model both in its shipyard aspects and in the development of naval systems. This relationship allows us to conceptually design the ships we need from scratch, based primarily on prospective studies that contemplate the scenarios our units will have to face in the future, and the required capabilities during their whole operational life cycle. Having the possibility of participating in this process – until the units are finally commissioned – provides us with a clear knowledge of the available systems on the one hand, and with what we call 'technological sovereignty' on the other. This has an important and positive impact on the industrial network of our country.

Navantia, apart from being the preferred shipyard that designs, builds and maintains Spanish Navy ships, provides – as an added value – the integration of sensors and weapons in critical on-board systems, like

metric' scenarios, ever more transregional and with an ever growing importance of the technological element, which is evolving at an even faster speed.

The Armed Forces must be prepared to operate in scenarios with the ample proliferation of state and non-state actors, demanding multi-domain actions. These actors are permanently innovating in terms of technology and, in many cases, with unpredictable behaviours.

The fight in cyber-space has become increasingly important, present in all types of conflicts. This importance will also occur with combat in outer space.

The navies must maintain their role as one of the main tools of government to counter the threats to national interests in the maritime domain. For our part, the Spanish Navy intends to continue being the reference point of the State's action at sea, either leading the maritime community providing the necessary support, or coordinating the joint effort.

Likewise, navies will have to be balanced, capable of operating in the entire spectrum of naval operations, being technologically advanced, flexible, capable of responding to any threat and interoperable with other navies, armed forces or civilian actors, with the possibility of exercising its

tion Agreement of December 1988. Later, in December 2012, a Second Amendment to this Agreement was signed in order to guarantee a better response to the new and evolving international threats. This agreement has permitted the stationing in Rota of four US destroyers equipped with ballistic missile defence systems.

The presence of these escorts in Spain is a sign of unity within NATO, as well as an additional opportunity to improve mutual training and interoperability. As a result, ships and crews from both countries regularly participate in naval exercises –like SMARTEX, for example– as well as in courses and conferences, in addition to exchanging personnel in various deployments.

ESD: Which parts of the world are Spanish Navy warships deploying?

Admiral Lopez: All in all, the Spanish Navy is currently maintaining a constant presence in the Euro-Atlantic, Mediterranean, Indian and Gulf of Guinea areas. Spain upholds a firm commitment with NATO and the EU. This is the reason why the Navy regularly deploys units in maritime initiatives and operations sponsored by these bodies. Deployments within the Standing Naval Forces, both with escorts and minehunters on the one hand, and NATO's operation 'Sea Guardian' on the other, lead us to be present in the Baltic, North, Mediterranean and Black Seas. As for EU's operation 'Atalanta', different units are recurrently deployed in waters off the Horn of Africa and Indian Ocean. Until a few months ago, we also had units deployed near the coast of Libya, participating in Operation 'Sophia', units that now remain in port ready to re-join the operation as determined by the EU.

Moreover, Spain makes an important effort to maintain a presence in West African waters and the Gulf of Guinea to promote the development of specific maritime capabilities of the coastal countries concerned. The Spanish Navy conducts exercises, drills and joint patrols with them to enhance the training of local naval services and maritime surveillance centres.

In recent years, we have also encouraged joint deployments with other allied navies like the ones from Canada, the UK, Australia and US. In this sense, there are plans to deploy a Spanish frigate with the French CHARLES DE GAULLE carrier strike group next year.

Worth mentioning also are the regular deployments of our off-shore patrol vessels in the Mediterranean Sea, the Great Sole Bank and waters off Canada to support Spanish and EU trawler fleets, which work in these waters in the course of national and multinational fishing campaigns like those framed within the Northwest Atlantic Fisheries Organization and the North East Atlantic Fisheries Commission.

I would not want to conclude without mentioning our presence in Antarctic waters, with the oceanographic research ship HESPÉRIDES or our endeavours in the area of defence diplomacy exercised all over the world by the training ship JUAN SEBASTIÁN DE ELCANO, especially in these years in which we celebrate the 5th Centenary of the first circumnavigation of the globe, an expedition organized by the Spanish Crown and carried out under the commands of Magellan and Elcano. Our training ship will sail around the world between August 2020 and August 2021, following (if possible) the route of the original expedition, one of the greatest naval feats in history.

The interview was conducted by Esteban Vilarejo.

Masthead

European Security & Defence

Issue 3/2020 · March 2020

ISSN 1617-7983 · www.euro-sd.com

Published by



Mittler Report Verlag GmbH
A company of the Tamm
Media Group

Publisher: Peter Tamm (pt)

Managing Editor and Deputy Publisher (Magazine): Stephen Barnard (sb)

Managing Editor (Newsletter): Dorothee Frank (df)

Industrial Editors: Waldemar Geiger (wg), Gerhard Heimig (gwh), Jürgen Hensel (jh), Hans Uwe Mergener (hum), Ulrich Renn (ure)

Sub-Editors: Christopher Ellaway-Barnard (cb), Christian Kanig (ck)

Correspondents: Rolf Hilmes (Army Technology)

Regional Correspondents: Roberto Guimarães de Carvalho (Brazil), Sidney Dean (USA), Tamir Eshel (Israel), Tim Guest (UK), Alex Horobets (Ukraine), Michał Jarocki (Poland), Jaime Karremann (The Netherlands), Beka Kiria (Georgia), Shinichi Kiyotani (sk; Japan), Yury Laskin (yl; Russia), J. Bo Leimand (Denmark), Wendell Minnick (Taiwan, North & East Asia), António Brás Monteiro (Portugal), Chet Nagle (USA), Korhan Özkilinc (Turkey), Luca Peruzzi (Italy), David Saw (France), Suman Sharma (India), Joris Verbeurg (Belgium/EU/NATO), Esteban Villarejo (Spain)

Layout:

CREATIVE CONSULTING GmbH, Germany

Production:

Lehmann Offsetdruck GmbH
22848 Norderstedt, Germany

Office address:

Mittler Report Verlag GmbH
Baunscheidtstraße 11, 53113 Bonn, Germany
Phone: +49 228 35 00 870, Fax: +49 228 35 00 871
info@mittler-report.de, www.mittler-report.de

Director of Marketing

Jürgen Hensel (jh)
Phone: +49 228 35 00 876, Fax: +49 228 35 00 871
juergen.hensel@mittler-report.de

Deputy Director of Global Marketing

Stephen Barnard
Phone: +49 228 35 00 886, Mobile: +44 7984 033154
stephen.barnard@mittler-report.de

Marketing & Business Development

Dr. Andreas Himmelsbach
Phone: +49 228 35 00 877, Fax: +49 228 35 00 871
andreas.himmelsbach@mittler-report.de

Waldemar Geiger

Phone: +49 228 35 00 887, Fax: +49 228 35 00 871
waldemar.geiger@mittler-report.de

Stephen Elliott, Director Marketing

Phone: +49 228 35 00 872, Fax: +49 228 35 00 871
Mobile: +49 1590 173 0346
stephen.elliott@mittler-report.de

Advertising Representatives:

USA/Canada/UK/Ireland/Eastern Europe/Israel/Turkey:

Stephen Barnard
Phone: +49 228 35 00 886, Mobile: +44 7984 033154
stephen.barnard@mittler-report.de

Russia & CIS:

Laguk Co., Yury Laskin, General Director
Krasnokholmskaya Nab., 11/15, 132, RF-109172 Moscow, Russian Federation
Phone: 007-495-911-1340, Fax: 007-495-912-1260, Email: yury.laskin@mittler-report.de

Subscription/Reader Service:

PressUp GmbH, PO Box 70 13 11,
22013 Hamburg, Germany
Phone: +49 40 38 66 66-319, Fax: +49 38 66 66-299
Email: mittler-report@pressup.de

European Security & Defence

© 2020 Mittler Report Verlag GmbH

The views expressed are not necessarily those of the editor or publisher.
All rights reserved. No part of this publication may be reproduced without prior written permission of the publisher in Bonn.

Cover Photo: Ceska zbrojovka a.s. (CZ)

Annual subscription rate:
€64.90 incl. postage

Peace on the Spectrum

Electronic Warfare – a Game Changer?

Thomas Withington

When it comes to peacekeeping, electronic warfare is a controversial subject. Could its cautious, wider adoption during such missions become a game changer?

Electronic Warfare (EW) is more closely associated with high-tempo air-land battle than it is with peacekeeping efforts. In fact, its deployment to support such missions, particularly those led by the United Nations (UN), is controversial. Nevertheless, while some in the global peacekeeping community are cautious regarding the use of EW en masse therein, others feel that it could have a growing role to play in supporting future undertakings.

Within the wide remit of EW, it is arguably the gathering of Signals Intelligence (SIGINT), primarily Communications Intelligence (COMINT) and, to a lesser degree Electronic Intelligence (ELINT), and the electronic attack of hostile communications systems and possibly radar systems, which may have the most relevance to peacekeeping. Gathering COMINT has two useful purposes: It allows you to determine the position of friendly, hostile, and civilian communications systems. These can include an array of emitters, from military tactical radios to commercially available civilian 'walkie-talkie' style handheld systems and civilian cell phones. Though gathering this information, COMINT practitioners can generate an electronic Order-of-Battle (ORBAT). By generating the electronic ORBAT, friendly forces can be located by identifying and localising their tactical radios via their emissions. Likewise, emissions from hostile communications systems can be identified and localised, along with emissions from cellphones which may be used by civilians or non-state actors such as militia units. COMINT practitioners may be able to perform similar identification and localisation for military and civilian Satellite Communications (SATCOM).

Author

Thomas Withington is an independent electronic warfare, radar, and military communication specialist based in France.



Peacekeeping operations can run the gamut from riot control to kinetic engagement. What role does electronic warfare have in supporting such missions?

Once the electronic ORBAT is drafted, a force can keep tabs on hostile forces relative to its own position. Imagine a nearby army unit which has in the past been known to attack civilians. It has been in the same spot for the past two days. COMINT has shown that their communications have been sporadically active, but have remained largely stationary. Suddenly, COMINT analysts detect a significant upsurge in radio traffic. A couple of hours later, they note that these emissions are no longer stationary. The army unit is now clearly moving, and heading towards a nearby village. Is the COMINT indicating that an attack on this village is imminent?

Collecting COMINT from areas over which a peacekeeping mission has responsibility for has other potential benefits. In our scenario discussed above COMINT practitioners would know where to direct electronic attack to jam these communications to perhaps slow down the momentum of the potential attack, or to transmit voice messages warning the army unit to cease and desist lest further action, possibly the use of lethal force, is taken.

History

EW has been used sporadically to support peacekeeping operations in the past. Open sources note that special forces from the Koninklijke Landmacht (Royal Dutch Army) were deployed to support the United Nations Multidimensional Integrated Stabilisation Mission in Mali (MINUSMA). MINUSMA has been in underway since April 2013. It is intended to help bring peace to the north of Mali which has been suffering an insurgency following a bid for independence by the National Movement for the Liberation of Azawad to achieve a homeland for the Tuareg ethnic group. Dutch special forces reportedly deployed COMINT gathering equipment, most probably manpack electronic support measures identifying and localising communications, to support their deployment. This equipment may have been used to eavesdrop on insurgent cellphone communications. Apart from this, precious little information has entered the public domain regarding the extent to which EW systems have been deployed during peacekeeping missions. Nonetheless, EW may have been involved in other operations, although not

AIR DOMINANCE



The **European** Solution



www.eurofighter.com

 **Eurofighter
Typhoon**

Effective Proven Trusted



Photo: UN

Refugee camps could be protected by electronic warfare equipment which could discern the presence of any armed groups potentially threatening such facilities.

reported due to sensitivities: "We do have limited COMINT capabilities that we can call upon in certain contexts," says a senior source close to peacekeeping operations, "but member states are very sensitive about discussing these."

These sensitivities are important discriminators vis-à-vis EW in conventional warfare and EW in peacekeeping: "For 'conventional' war fighting, EW tends to be constrained only by your own capabilities (technology and people) and any self-imposed constraints; such as limitations on jamming to avoid 'blue on blue' electronic fratricide," observes Alan Blackwell, a former British Army EW practitioner and director of ABAL Insight: "In peacekeeping operations, there is a significant additional constraint. You are operating usually with the consent of the national government/authority, and acting in support of broadly civil aims."

The source adds that there is no 'one size fits all' as regards COMINT deployment to support a specific peacekeeping operation. Much will depend on the sensitivities of the host nation where the mission is taking place: "In some theatres using COMINT to listen in on militias is not a sensitive issue," they continue "but it can become one when a state's government thinks you may be listening in on their communications." Ultimately "COMINT is not a standard capability that we will bring to peacekeeping operations as a matter of routine."

EW is not restricted to COMINT. The domain also encompasses the jammers used to nullify Radio Frequency (RF) activated Remote Controlled Improvised Explosive Devices (RCIEDs). As the carnage during the NATO- and US-led interventions in Afghanistan and Iraq illustrated such bombs can be activated by a cornucopia of plenti-



Photo: US DoD

Convoys supporting peacekeeping operations can be vulnerable to attack by RCIEDs. Jammers have been used to this effect in the past supporting peacekeeping missions, although their deployment can be controversial.

ful RF-driven wireless devices. These can include cell phones, garage door openers and even baby monitors. This threat has triggered a corresponding development of vehicle-borne and manpack Electronic Countermeasures (ECMs) that can be used to protect convoys, individual vehicles and dismounted troops:

"Some of our troop contributing countries deploy with ECMs, particularly to protect against RCIEDs," the source articulated. For example, vehicles deployed to support the United Nations Interim Force in Lebanon which monitors the cessation of hostilities in Lebanon following Israeli's invasion and withdrawal from the country in 1982 and 2000, respectively, have been so equipped. The source cautioned that the deployment of RCIED jammers "is not always universally popular because the equipment can be really sophisticated from the perspective of the host governments" who might be concerned that such equipment is used to gather COMINT. Such concerns are understandable given that the Very/Ultra High Frequencies of 30MHz to three gigahertz waveband where such potential RCIED activation devices reside are the same which host civilian and military communications. There are also occasions where, despite the sensitivities that EW systems writ large may generate, the UN or the international organisation tasked with leading the peacekeeping mission may insist that certain EW materiel is allowed into theatre: "We would not deploy a close air support platform without self-protection systems like ECMs," the source confided, reflecting the threat from infrared-guided Man-Portable Air Defence Systems (MANPADS) which are present in several theatres around the world. They added that a similar reticence would be found over the deployment of warships to support peacekeeping missions which lacked EW systems to protect them against radar-guided Anti-Ship Missiles (AShMs) which may be fired by belligerents from littoral areas in war-torn states.

Threat Proliferation

These are not idle concerns. Recent years have witnessed the proliferation of both threats. Turkish media reported in late December 2019 that Russian-origin KBM 9K38 IGLA (NATO reporting name SA-18 Grouse) infrared MANPADS had been found by Turkish forces during operations against Kurdish insurgents in northern Syria. Similarly, on 9, 12, and 15 October 2016, a flotilla of US Navy ships, including the ARLEIGH BURKE class destroyer USS MASON came under attack from a total of nine AShMs believed to have been fired

by Houthi insurgents involved in Yemen's civil war. The ships were navigating the Bab el-Mandeb Strait connecting the Red Sea to the Gulf of Aden. Fortunately, the ships were able to repel the attack through the use of their soft and hard kill defensive systems notably BAE Systems' NULKA active RF decoys and Raytheon RIM-66 Standard Missile-2 series semi-active radar homing surface-to-air missiles.

The use of EW for force protection can be controversial in other ways. Deploying EW to protect troops on peacekeeping operations, although defensive, might not be seen that way by the host nation: Force protection depends on "understanding the intent of hostile actors. That often requires a more aggressive form of EW to seek out intelligence to put together the threat picture," says Mr. Blackwell: "The extent to which this is needed, justifiable and/or acceptable can be a sensitive matter and it is easy for a host nation, which by definition is on the 'back foot' if it has had to ask for peacekeeping assistance, to feel threatened by a foreign military force on its soil."

Despite these challenges, the source emphasised that sensitivities regarding the deployment of ECM-based self-protection equipment can often be ironed out by dialogue with the host nation where the peacekeeping mission will occur: "We tend to be quite transparent about what we are deploying and to be open to the host governments... This is all sorted out through discussions and negotiations and follows the three basic principles by which UN peacekeeping operations are organised: the defence of the force and the mission, the impartiality of the force and the consent of all parties."

Equipment

From an equipment perspective armies supporting peacekeeping operations tasked to deploy EW have a wide array of material to choose from, particularly in the COMINT and Communications Jamming (COMJAM) domains. Such equipment will at the very least need to cover a 30 megahertz to six gigahertz waveband. This will allow it to gather COMINT on civilian

and military very/ultra high-frequency (V/UHF) communications. Dismounted troops can employ backpack-based COMINT and COMJAM systems such as Allen Vanguard's SCORPION-2, Chemring's RESOLVE, DSE's MRJ family, Elettronica's ELT/334(V)2, Enterprise Control Systems' Kestrel series, GEW Technologies' GMJ-9000 family, L3Harris' Broadshield-LCS/MCS, Leonardo's GUARDIAN-W2/C2, and Plath's JS-MC and AJS-40P. Likewise, deployments may require larger mobile COMINT/COMJAM platforms capable of providing a wider radius of coverage. Appropriate platforms in this regard include

Albrecht's SAJ-2000MD, Israel Aerospace Industries' EL/K-7020 and EL/K-7012, HP Marketing and Consulting's HP-326OH/OM; Indra and Rohde and Schwarz's V/UHF jamming systems, and SRC's TRC-274. Finally, RCIED jammers to protect convoys will continue to be an important consideration: Aselsan provides the Sapan reactive counter-RCIED jammer which joins Netline's C-Guard-RJ, SESP Group's Jamkit and Sierra Nevada's AN/PLQ-9 JCREW-3.1. While this is by no means an exhaustive list, it provides an indication of the products available. These will vary considerably in price. This is important as some armies

REGISTER AT
EWEUROPE.COM



COMPLEX ELECTROMAGNETIC WARFARE AND THE MULTI DOMAIN BATTLE

Taking place in Liverpool, the AOC's 25th annual European event will connect world-leading electronic warfare sector experts across military, government, academia and industry. The show will feature two technical conference streams, alongside an exhibition area for specialist suppliers to showcase their technologies, products and services.



1,250+ EVENT ATTENDEES



85+ SPONSORS & EXHIBITORS



60+ VIPS/ DELEGATIONS

Headline Partner



Intelligence Workshop Partner



Produced by



For more information please contact us:

✉ eweurope@clarionevents.com 🌐 www.eweurope.com ☎ +44 (0)20 7384 8102



Photo: Dutch MoD

The deployment of EW platforms, particularly mobile assets, could provide peacekeeping missions with useful COMINT and COMJAM capabilities, yet such deployments must be executed carefully.

may lack the cash to splash out on highly sophisticated COMINT/COMJAM systems. Moreover, the electronic threats which maybe encountered during a peacekeeping mission may be relatively unsophisticated meaning that an army might not necessarily need to buy advanced EW equipment to ensure they can meet their mission's electromagnetic obligations.

The Future

Walter Dorn, professor of defence studies at the Royal Military College of Canada, believes that the UN should think more about the wider adoption of EW, particularly electronic attack to support its peacekeeping efforts: "Jamming should be an important capability for the UN." Dorn argues that jamming of a belligerent's communications or radars provides a useful means of frustrating offensive action which might violate the terms of a ceasefire, for instance, short of using kinetics: "You could see an attack occurring, or about to occur, and you could use jamming to disrupt this," he argues. Alternatively, electronic attack could be used to intercept the belligerent's communications and to transmit warnings regarding the potential consequences of their actions. Similarly, collecting COMINT could pay dividends when particular individuals such as alleged war criminals are being sought as part of the mandate. Monitoring the spectrum could reveal the

individual's location, as well as revealing their intentions and behaviour, helping with their arrest.

The relevance of the electromagnetic spectrum to peacekeeping operations will only increase, Blackwell believes, driven by the demands militaries place on the spectrum for communications: Even, a rag-tag militias using civilian handheld radios to communicate are still using the spectrum: "More military activity will be conducted over data networks that look increasingly similar, often using the same communications bearers, as civilian data," Blackwell posits: "The advent of 'cyber', in its widest sense, has further blurred the distinction between military and civilian data and communications that it is almost impossible to distinguish between activities necessary to protect one's own troops, and activities that seek to gain intelligence".

As noted above, the use of electronic warfare writ large can be highly sensitive in peacekeeping, and electronic interception and attack could be similarly controversial. Dorn argues that "the UN should be doing this, but it should be done at a very tactical level against specific targets, and it should only be done with high level permission to provide safeguards against abuse of this capability." Having such clear and transparent safeguards could give reassurances to host governments and the civilian population where the peacekeeping mission is taking place "that it is not the UN's intention to perform widespread spying." Likewise, it could be stressed that any deployed EW capabilities are being used to protect the population, Dorn underscores. The Janjaweed militia which terrorised isolated villages in the region of West Darfur in south-western Sudan were reliant on tactical radios, thought to have been supplied by domestic Sudanese companies and by the Islamic Republic of Iran, and SATCOM. Electronic attack directed against such communications could have significantly degraded the ability of the Janjaweed and their Sudanese government sponsor to command and control such attacks.

"The UN is a very cautious organisation, and its leaders do not want a military mind-set to dominate in peacekeeping operations," Prof. Dorn observes, echoing the three basic principles of peacekeeping missions cited above. Nonetheless, while "there is a reason to be cautious it should not stop innovation," he argues. "Is it not better to do electronic damage rather than physical damage, and only use force as a last resort?" ■

Photo: US Army



Backpack EW systems would have the potential to protect dismounted troops supporting peacekeeping operations, as well as helping to gather COMINT. Such capabilities may have been deployed by Dutch special forces during recent peacekeeping missions.



Viewpoint from Paris



Macron Turns to Foreign Policy while Domestic Plans Falter

David Saw

Paris limped into 2020 in the midst of a transport strike that had continued at varying levels of intensity for more than a month, interspersed with the odd day of general strike action to spice matters up. All of this is in response to the plan by French President Emmanuel Macron to reform state pensions for transport workers amongst others.

For a President and a government that prides itself on being cleverer than anybody else in France, or Europe for that matter, their handling of the pensions issue has been particularly tone deaf. The government already has a problem with their plans to change many of the employment terms and conditions for workers on SNCF, the national railway system. As if that were not bad enough, a report on the future of SNCF is also in the works and that will doubtless call for 'reforms' and this will inevitably lead to further labour disputes or as they are described in France "mouvement social."

All of this is a concern for the French government, but their belief was that with the first round of the next presidential elections due in April 2022 it is not as if they are dealing with an existential crisis. They hold to the conventional wisdom that it is not as if Macron and his La République En Marche!(LREM) party have any real political opposition to worry about. The centre left is comatose, the extreme left is unelectable and the centre right has lost its way, and all that is left is Marine Le Pen and the Rassemblement National (RN). Macron beat Le Pen in 2017 and, barring something catastrophic, would expect to beat her in 2022 should history repeat itself. Unfortunately, polling is showing that Macron is becoming increasingly unpopular and, for the first time, might even be vulnerable in the next election. All French President's become unpopular during their term of office, the key is to find a way to change people's perception of the President. One way that this can be achieved is to generate a

foreign policy triumph, or the perception of a triumph, it worked for Jacques Chirac in 2003 regarding Iraq. It would appear that Macron and his advisers believed that inserting Macron and France into the ongoing problems between the US and Iran offered fertile ground for a foreign policy success.

France, like the other European signatories to the Joint Comprehensive Plan of Action (JCPOA), otherwise known as the Iran nuclear deal, was fully aware that this arrangement would not stop Iran becoming a nuclear power. What it hopefully would do was to postpone the need for Europe to do anything about Iranian nuclear capabilities for a considerable period of time, and by then perhaps something might have changed.

Then the Trump administration pulled out the JCPOA and re-imposed sanctions on Iran. On the other side of the coin, Iran's activist and adventurist foreign policy in the Middle East gathered pace raising tensions in that region. France believed that tensions could be reduced if Iran was granted sanctions relief and floated the idea of spending US\$15Bn to end the burden of sanctions on Iran and re-open negotiations regarding JCPOA and other issues. Nobody was really interested.

Iran then misread the Trump administration and sought to strengthen its position in Iraq, actions which eventually led to the death of Islamic Revolutionary Guard Corps (IRGC) commander Qasem Soleimani in Baghdad in early January. Tensions still remain high in the Middle East, although it appears that at this point both the US and Iran are exercising a commendable level of self-restraint. Sadly, for Macron and France, their ability to insert themselves into the Iran/JCPOA situation remains limited and perhaps this is fortunate because nobody can predict with certainty how events will unfold. As such the search for a foreign policy triumph to counteract the waning popularity of President Macron continues.

Turkey's Elite Police Unit



Korhan Özkilinc

The Police Operations Department of the Directorate-General for Security is a special police unit for combating terrorism and violent and organised crime. Its name is Polis Özel Harekat (PÖH), which translates as Police Special Action. After the failed military coup of 15 July 2016, the PÖH special unit was transformed into a paramilitary unit.

The PÖH was founded on 22 March 1983 by decision of the Minister of the Interior and placed under the command of the Ministry of Public Security. Initially, the unit was responsible for organised and violent crime, hostage recovery, and providing bodyguards for Turkish officials and ambassadors to the Turkish state. In

to the Minister of the Interior, while operating under the Directorate-General for Security. The Minister decides on PÖH deployments. Its headquarters is located in Ankara's Gölbaşı district and is headed by a president who is supported by three vice-presidents and ten heads of unit. The PÖH is based in 62 provinces and is

for being members of the Islamist Fetullah Gülen movement, which forced the government to quickly fill the vacancies. This explains why PÖH has grown rapidly out of fear of another military coup. For this reason, the admission criteria were reduced from university degree to high school diploma. During the state of emergency, the PÖH hired a further 10,000 new police officers. While the selection procedures were adapted to the difficult situation of the police, operational training and shooting practice were intensified. Of course, training and further education will also take place in the future professional life. The headquarters in Gölbaşı is developing new training concepts, personnel structures and armament systems, among other things. The PÖHs is one of the few security forces in the world to deploy women troops in frontline combat operations. In August 2019, Turkish Interior Minister Süleyman Soylu published the latest figures, according to which there are 25,000 PÖH members and numbers that are growing.

Photo: via author



Turkey's elite police unit PÖH operates with specialised equipment in remote mountainous regions against terrorist organisations.

1987, the Ministry of Public Security subsumed the unit and assigned it to the Counter Terrorism Division of the Turkish Police under the direction of Special Operations Group Authorities. Since its establishment, not only has the organization's responsibility expanded, but the units are now operating with specialized equipment in rural, mountainous and remote areas against terrorist organizations such as PKK, YPG, PYD, TKP-C and IS. On 13 July 1993, the unit was turned into a Special Police Task Force within the Directorate General for Security and, following the coup d'état attempt, into a 'Bureau for Special Police Operations' on 25 August 2017. It now reports directly

subdivided into working groups, special units, logistics, personnel, training and education units.

Training and Education

In its early days, the PÖH unit, consisting of several hundred police officers, occupied a special position in the Turkish national consciousness. Recruitment criteria are very similar to that in the West; physical ability and stamina are necessary requirements, but another requirement was a university degree or a successful degree from the Turkish police academy. After the attempted coup d'état, thousands of police officers were arrested

Resources and Missions

Special units are a country's strategic resource and their deployment is of great importance. Mission success frequently depends on expensive equipment. Until 2015, PÖH units were equipped with short- and long-range weapons and protective equipment against ballistic threats similar to Western organizations. After the coup d'état attempt, however, they also received heavy weapons. These include short and long rifles with laser modules, foreign branded precision rifles, hand grenades, and so on. In the last three years, additional large-scale equipment has been purchased, transforming the PÖH more into a paramilitary unit. These are heavy armoured vehicles of domestic production, such as the BMC KIRPI I-II, BMC VURAN, BMC AMAZON, NUROL EJDİR, OTOKAR COBRA 2, and OTOKAR

URAL. They also operate Sikorsky UH-60 BLACK HAWK helicopters to take them to inaccessible places. President Erdogan also considered equipping the PÖH units with T-129 combat helicopters, but these considerations were later discarded. The PÖH also have frogmen with high-speed boats and corresponding weapons. The types of operations are categorised according to special tasks:

- Direct Action – combat operations of operational and tactical importance,
- Reconnaissance – reconnaissance and information gathering,
- Hostage Recovery
- Special Police Support
- Training
- Counter-terrorism
- Development of tactics – testing new methods, tactics and techniques,
- Covert Operations – at home and abroad, in particular in Syria and Iraq.

International Networking

Since their foundation, PÖH members have helped other countries to set up special units of their own, for example in Afghanistan, Albania, Algeria, Azerbaijan, Bosnia and Herzegovina, Jordan, Iraq, Kosovo, North Macedonia, Uzbekistan, Pakistan, Poland, and Syria. In international workshops and training courses, they network with other special forces abroad and exchange important information and skills.

Interoperability

After the coup d'état attempt, the PÖH not only grew in personnel, but also acquired additional competences to be able to cooperate more intensively with the



Photo: via author

The PÖH is located in 62 Turkish provinces and in many cities in northern Syria.

Turkish army and the paramilitary units of the gendarmerie at both home and abroad. Through its interoperability with regular Turkish troops, PÖH has acquired the capabilities of various army systems. The special police units now also operate heavy weapons. The joint involvement of PÖH and the Turkish military initially had a difficult birth. In the initial phase of the joint operations in South East Anatolia and Northern Syria, there were strategic and tactical problems that inevitably led to losses at the operational level. To overcome this, three major strategic adjustments were made with the Turkish military in terms of military planning, tactical planning and medical planning. In military planning, the plan-

ning and command principles of Special Forces operations were taught at the Task Force level, so that planning is carried out at the highest level. In tactical planning, the tasks of the PÖH concern not only the freeing of hostages, the fight against terrorist networks or the arrest of wanted persons, but the special units must also be able to regard the materials and equipment of the military as their own weapon systems and to carry out operations independently in the mountains, deserts or forests, especially in the Black Sea region. If the PÖH and the JÖH (special units of the gendarmerie) have to operate far away from their own troops, they should also be able to take medical care into their own hands, for example,

BRENSAN

www.brensan.com.tr



High capacity and cranking performance



Tremendous life cycle and weight saving



Fast charging and maintenance free



Smart CAN-BUS monitoring



▶ 6T BATTERY 24V LITHIUM



BRENERGY™



Photo: Pivox

By placing themselves in the way of tanks, Ankara's civilian population obstructed the attempted coup d'état in July 2016.

to treat the injured until they are handed over to the rescue teams of the regular army. These three parameters enable the PÖH to conduct joint operations with the military at home and abroad.

The Trench Operations

After the parliamentary elections in Turkey in June 2015, the Kurdish terrorist organisation PKK intensified the bomb attacks on the security forces and the civilian population with the aim of plunging South Anatolian cities into chaos. To contain the situation, on 24 and 25 July 2015 the General Directorate of Police launched countermeasures against the PKK, DHKP-C and ISIS in many cit-

ies. The fighting escalated rapidly and led to a war-like situation in the region. The PKK had grown rapidly because it used the "solution process" initiated by the AKP government from September 2013 to July 2015 to reform and prepare for home and street fighting. During these two years, many PKK fighters had moved from the mountains to the inner cities, turning many houses into large ammunition and weapons depots and connecting hundreds of houses with tunnels. During the fighting, the Turkish armed forces, especially the PÖHs in the southeast Anatolian cities of Diyarbakir, Hakkari, Cizre, Mardin and Nusaybin, suffered losses during house-to-house fighting. The trench warfare was ex-

hausting. The terrorists tried to mobilize the civilian population against the Turkish armed forces. City curfews were imposed and large areas were temporarily declared military security zones. Curfews were only abolished once the cities were liberated from PKK terrorists. The PÖHs and army confiscated thousands of large-calibre weapons and defused over 10,000 IEDs. After the fighting, the cities were rebuilt. Almost 40,000 security forces and well over 5,000 terrorists were involved in the fighting - 250 members of the army and police died, and the PKK's losses were well over 3,000. From then on, the population admired the PÖH all the more, and the number of applicants increased rapidly.

The Failed Coup d'État in 2016

The attempt by parts of the Turkish military to overthrow the Turkish government of President Recep Tayyip Erdoğan and the cabinet of Binali Yıldırım (AKP), with the help of US-based priest Fetullah Gülen, is perceived in recent Turkish history as the military's betrayal of its own people. In Ankara and Istanbul, there were serious clashes between the putschists and civilian population. The civilian population obstructed the coup by often grouping themselves in front of tanks, which resulted in dozens of civilians being killed. More than 250 people were killed. The PÖHs and the police, together with the population, joined forces against the putschists and fought them with small arms.

The putschists undertook cruel action against the population. The situation escalated when the parts of the air force attacked the Parliament, the secret service centre Millî İstihbarat Teşkilâtı (MİT) and PÖH headquarters in Ankara/Gölbaşı with bombs. On the evening of 15 July, the senior leadership of PÖH were called to a meeting at the headquarters to discuss how to address the attempted coup d'état. It was at this moment when the F-16 aircraft bombed the headquarters, killing 51 elite police officers, members of PÖH and while an F-16 downed a police helicopter.

All in all, the botched coup attempt damaged the reputation of the army among the Turkish population, and saw thousands of young volunteers applying to join the police service. The destroyed PÖH headquarters was quickly rebuilt and ceremoniously reopened by President Erdoğan, with family members of killed PÖH officers present.

Photo: via author



During 'Operation Olive Branch' in early 2018, Turkish-supported 'Free Syrian Army' fighters hoisting the Turkish and Syrian flag on top of Barsaya mountain.

The Turkish Military Offensive in Northern Syria from 2016 to 2017

Turkey's military offensive 'Operation Euphrates Shield', which began on 24 August 2016, saw Turkey become the third country after Russia and Iran to intervene in Syria. Later, the US armed forces would also intervene in Syria, alongside several Kurdish militias, including PYD, the 'henchmen' of the PKK terrorist organization. The reason for the military offensive was an IS suicide attack in Gaziantep on 20 August 2016 that killed 60.

The Turkish military offensive had two aims: first, to ensure security at Turkey's southern border by ridding the region of terrorist groups such as PYD, PKK and IS. Secondly, to preserve the territorial integrity of Syria, which is by no means easy, as it contradicts the intentions of Russia and Damascus government. Alongside regular Turkish forces, PÖH units were involved in the offensive. As in previous missions, their experience in urban combat proved particularly helpful.

On 29 March 2017, IS was expelled from the Turkish border region and the offen-

sive was declared over. The PÖH established the Free Syrian Police to resume local police work. Training, equipment and vehicles were provided by Turkey, and the local police will continue to be supported by local PÖH officers. In addition to the special operations of the JÖH, 4000 PÖH police officers will be stationed in the region. The offensive was the first step in creating the basis for further activities in the region. In the meantime, PÖH has acquired additional competencies at home and abroad. In addition to police activities, their paramilitary skills were also put into practice.

The Turkish Military Offensive on Afrin

The military offensive in the city of Afrin in Northern Syria began on 20 January 2018 under the name 'Operation Olive Branch'. The aim was to destroy the Kurdish PYD militias, which Turkey classifies as extension of the PKK terrorist organization, and to expel them from northern Syria and from the border area to Turkey. As a sovereign state, Turkey aims to undermine the autonomy claims of the Kurds in

northern Syria and northern Iraq. Kurdish nationalism supported, in particular, by the two terrorist organizations YPG and PKK. Turkey has notified the US of its offensive against the YPG and its concern for its security interests.

However, Turkey's concerns as a long-standing NATO partner were not heard in the US. Instead, the US provided the Kurdish militias in the Northern Syrian border regions with thousands of containers full of weapons and trained them militarily to help them fight IS. In a speech, a senior US official spoke of 60,000-strong PYD troops. In principle, Turkey's fears should be taken seriously, because the weapons supplied could one day be used not only in Turkey but also in Europe, thereby jeopardising Europe's security. The Turkish armed forces needed about three months to conquer the northern Syrian city of Afrin. On 18 March, the Turkish general staff announced that Afrin was under the control of Turkish troops and Free Syrian Army.

Shortly after capturing the city of Afrin, Turkey began to consolidate its control over the district through a series of measures. During the conquest of Afrin, PÖH

FUTURE FORCES FORUM International Platform for Trends & Technologies in Defence & Security
www.future-forces-forum.org

21 - 23 October 2020
PRAGUE, CZECH REPUBLIC

International arms exhibition Future Forces: **200+ exhibitors**, indoor and outdoor live demos

Expert events on current topics:

30+ events aimed at military, public and private sector cooperation

Networking (B2B, B2G, G2G):

7000+ participants from **65 countries**; **1200+ official delegates**

from governmental institutions; armed, security and rescue forces; national and international organizations (NATO, EU); and universities



DEFENCE - SECURITY - INTERNATIONAL ORGANIZATIONS - GOVERNMENTS - INDUSTRY - R&D

Photo: via author



Turkish PÖH elite policemen in the southeast of Turkey

and JÖH, in particular, were given special tasks and fought house by house. To ensure security in Afrin, the PÖH trained local forces as security personnel called 'Surta'. The local police organization resembles the institutional structure of the Turkish police and is structured as follows: 'Counter terrorism', 'Intelligence service', 'Public order', 'Traffic', 'Crime scene investigation', 'Bomb destruction' and 'Commandos'. In this way, normality was returned to Afrin for people who for years had only experienced only war. The activities of the PÖH is coordinated with that of the Turkish military and the Turkish secret service. In the cities of Northern Syria, the PÖH regulates not only everyday life and security of the population, but also the entrances and exits to the cities, in order to gather information against terrorists for future operations. This has also led to a number of attacks being stopped well in advance.

Operation Peace Spring

During the Obama administration, the Turkish government emphatically demanded the establishment of a neutral

zone in northern Syria, which had two aims: first, to stop the establishment of a Kurdish state by Kurdish terrorists, which is however, is heavily supported by the US with weapons and military advice. Secondly, Turkey intends to resettle Syrian refugees living abroad to the neutral zone. At this point, it is important to highlight one issue. namely, in recent years, Kurdish militias have carried out ethnic cleansing, forcing the Arab population to leave these areas and, at the same time, settling Kurds here. This was undertaken to take control of several hydroelectric dams in the Euphrates and several natural gas wells in the region. Yet, it would be fatal to let these fall into the hands of terrorists, because that would mean that in future the international terrorist organization PKK, PYD and IS could run the arms trade. In this context, in his speech to the UN General Assembly in New York on 24 September 2019, Turkish President Erdogan again called for more support for the supply of Syrian refugees and for the establishment of a neutral zone with a depth of 30 km and a length of 480 km. In this

zone, the establishment of settlements is planned – in total 140 villages and 10 cities for 2-3 million people. However, Ankara alone cannot afford the cost of building these new settlements, which is why President Erdogan wants an international fund to cover the costs.

When international politics failed to take its concerns seriously, Turkey put its intention into practice. First, Turkey organized allies. On 4 October 2019, in the south-eastern Anatolian city of Sanliurfa, the official foundation of the 'National Syrian Army' was announced, which was formerly called the 'Free Syrian Army'. The PÖH was also involved, but only after the successful completion of the army's offensive. After the US announced the withdrawal of its soldiers from the neutral zone, the Turkish army invaded Northern Syria on 9 October 2019. Although the US expressed its concerns, Russia, Iran and the Damascus government showed understanding for Turkey's plans, several European countries criticized Turkey's advance.

PÖH and JÖH provided support for this military offensive, defusing several thousand IEDs, recapturing buildings, and so forth. The PÖH will probably play a major role in setting up the infrastructure of the settlements, developing and training local police and ensuring the security of the local population in many Syrian cities.

Outlook

The security policy changes in Turkey and the unresolved wars and disputes in the neighbourhood have made PÖH rebalance its tasks. Since the coup attempt, the Special Unit has grown from battalion- to division-size and will reach a corps size in a few years. Although transforming the Special Operation Forces into Special Paramilitary Forces will have an impact on quality, they are trained professionals and know how to deal with challenges. It is interesting, though, that the Ministry of the Interior operates the Gendarmerie, the regular paramilitary armed forces and its special unit the JÖH in addition to the General Directorate of the Police and its PÖH. As an international consultant for defence industry, I had the honour to deliver lectures at PÖH's headquarters in Gölbaşı. Particularly after the military attempt and the subsequent operations in Northern Syria and Northern Iraq, the PÖH has received great attention domestically while enjoying the confidence of the Turkish population. ■

Moral Decision-Making Training in the Military

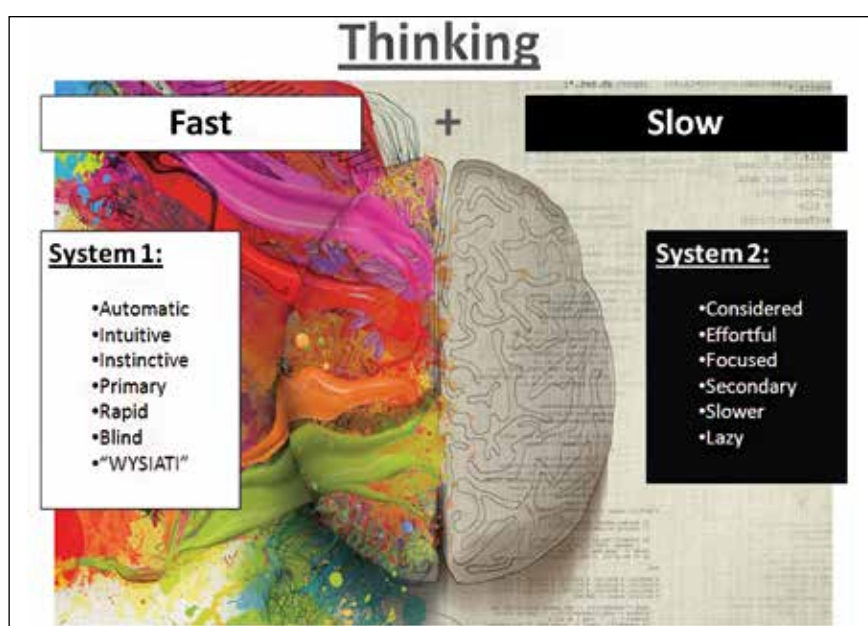
Chloe Brennan

The military profession is essentially moral in nature as the decisions made can have considerable effects on the security of others.

Possibly exceeding any other profession, the moral decisions made in combat can have lasting effects on the military decision-maker, their comrades, enemies, and civilians trapped in the conflict as well as on mission success and public perception of the military. Whilst conventional military warfare presents moral challenges, modern warfare brings a more complex array of ethical issues. Operations have been regarded as 'not really war at all', but as missions with poorly defined enemies and morally unclear objectives that contain peacekeeping missions, interactions with civilians, nation-building and combat all in the same mission. Insurgents deliberately push against the moral standards of Western cultures to provoke retaliation from Western troops. With the growing complexity of these military operations, interactions with morally challenging dilemmas become inevitable.

The Unconventional Battlefield

In addition to these modern complexities, soldiers operate in the same environment of physical and mental stressors common to classical warfare. Environmental stressors include harsh climate, difficult terrain, persistent noise, and prolonged threat of danger. Psychological stressors involve time pressures, ambiguous intel, fatigue, sleep deprivation, and juggling competing demands. Under such stressful conditions, soldiers must make split-second moral decisions. The impact on decision-making is a reduced ability to use rational thought



The most common theory of how people think was proposed by Daniel Kahneman in 2011. System one is the fast, intuitive, emotional processing system and system two is the slower, more deliberative and logical system. Under pressure, system one is used which can cause poor moral decision-making.

processes and a greater influence of emotions. This causes automatic, intuitive decisions that rely on bias. Here is where the potential for misconduct arises.

Ethical scandals have plagued Western countries including the UK, the US, Canada, The Netherlands, and Australia amongst others. In 2005, US troops broke humanitarian laws by killing 24 Iraqi civilians, including women, children and the elderly in Haditha. Troops also physically abused, tortured and murdered Iraqi prisoners in Abu Ghraib. These events can be compared with the My Lai Massacre in Vietnam in 1968 which saw over 400 civilians murdered by US troops. More recently in 2011, a British soldier received widespread media attention when he was convicted of murdering a fatally injured Taliban fighter and breaking International Humanitarian Laws. Moral transgressions by armed

forces cause public scrutiny, which can derail public support for the mission and undermine mission legitimacy and effectiveness. These events, even if rare, can set back the success of an entire mission.

Moral Decision-Making Training

A succession of high profile moral violations by Western militaries caused a renewed focus on military ethics. As a consequence, many armed forces around the world have integrated military ethics in their training and education. Despite this, an examination of current military ethics programs reveals limitations that need to be addressed to better prevent moral transgressions.

The US military commissioned groundbreaking research in 2007, the first to systematically examine moral attitudes

Graphic: The Langmaid Practice

Author

Chloe Brennan is a PhD student at the University of Liverpool. Her research focuses on moral decision making in military personnel, with a view to understand how to input moral decision making capabilities into automated systems.

Photo: Joint Forces



British troops defend against a Canadian mechanised brigade group in a simulated town called Ashigli during Exercise Maple Resolve 2019, Wainwright, Alberta, Canada.

in combat since World War 2. Responses from US soldiers deployed in Iraq and Afghanistan revealed concerning findings:

- Less than 50% believed civilians should be treated with dignity and respect.
- Over 30% argued torture should be used to save a team member's life.
- 10% reported unnecessarily mistreating an Iraqi civilian through vandalising their property or physical abuse.
- Less than 50% would report a comrade for immoral actions.

This research encouraged the Pentagon to announce that all US servicemen based in Iraq would uptake further military ethics training. The training was administered 7-8 months into a deployment. Lieutenant General Peter Chiarelli, then commander of the Multinational Corps in Iraq said the training would focus on "professional military values and the importance of disciplined, professional conduct in combat". Movie clips depicting ethical dilemmas similar to the misconduct that occurred in the study were viewed and discussed in groups. A programme evaluation found training successfully reduced unethical attitudes towards civilians, reduced witnessing others commit ethical violations and increased likelihood to report unethical actions made by team members.

Despite improvements in ethics training, research in 2008 found whilst 80% of US soldiers and marines had received ethics training, 25% reported that they had encountered morally challenging events in Iraq that they were unsure how to deal with. This demonstrates that early ethics training still needs to improve decision-

making. Issues in ethics training apply to other Western countries as they often offer character development classes to instil moral virtues. For instance, the UK teaches selfless commitment, courage, discipline, loyalty and respect of others whilst in Canada, they teach duty, loyalty, integrity and courage. Teaching moral virtues will not prepare soldiers to respond to ethical challenges in the midst of war. A better alternative is to provide the military with moral reasoning skills which can be applied to many complex scenarios.

Current attempts to go beyond simple character development classes are often not evidence-based. The Royal Military Academy Sandhurst in the UK teaches the Geneva convention and practices its application in field settings but evidence into the effectiveness of the programme is scarce. Other programmes use a top-down, centrally directed approach, such as the 1997 Canadian Department of National defence ethics programme and the German system of Innere Führung. Innere Führung encourages integrity and human dignity and is required for two hours every month regardless of rank or assignment. Top-down approaches can result in another check in the box requirement and can be used to blame ethical misconduct on "bad apples" rather than organisational training.

The main issue with current military ethics programmes is an overreliance on case studies that do not simulate real war conditions. This will only train soldiers in using their rational, thoughtful decision-making processes, and will not activate the emotional, intuitive moral response. A more effective approach to training is

applying classroom learning to a high-intensity field setting because moral actions made in the heat of a conflict differ from hypothetical discussions. The training needs to be realistic, complex and immersive to simulate the soldier's operational environment.

Some countries have integrated ethics training into simulations in this way. In response to morally challenging operations in Afghanistan, the Canadian Manoeuvre Training Centre (CMTM) inserted ethical dilemmas into a 3 week immersive, large scale, and complex field training event called Exercise Maple Guardian. In 2006, the Canadian Battlegroup took part in the training before deployment in Afghanistan, role playing patrols, reconstruction and training of the Afghan National Police and Army. Soldiers would confront sexual abuse, physical violence to women or theft by Afghani security forces. Training facilitators then evaluated how effectively the situation was dealt with and discussed this in a formal debrief.

Canada still uses these simulations to train armed forces, with Exercise Maple Resolve running in May this year. 5500 soldiers, 900 of which were from the US, 150 from the British Army and 40 from the French army tested their abilities to integrate as allies in a realistic context. Teaching ethics in this environment should provide soldiers with moral reasoning skills and is needed across more countries. However, this training is resource-intensive and there may be better technological solutions to ethics training.

Technological Alternatives

Simulations could still be used to present soldiers with moral dilemmas in a training scenario. Moral dilemmas force soldiers to choose between two options, both of which cause harm. For instance, one dilemma could force the soldier to decide whether to torture the enemy to save a team member's life. A second dilemma could make the individual choose whether to kill a few innocent civilians in order to save a greater number of lives. The simulation needs to emulate deployment complexities by incorporating operational stressors. One suggestion could be that the dilemma is presented during other tasks to simulate competing demands, and with only limited time to respond to mimic time pressures.

The simulation must also be realistic to activate the emotional, intuitive response. This is necessary because current classroom techniques are only likely to

train soldiers in appropriate decision-making when using logic. To reduce the vast resources required to make a real simulation possible, virtual reality (VR) is a promising software. VR presents soldiers with a hypothetical dilemma but requires an actual behavioural response rather than a simple verbal answer. A head-mounted display with a stereoscopic monitor can deliver high definition images via cables which are connected to a computer. Avatars appear on the screen, the gender and ethnicity of which can be altered. The sights and sounds of people in distress are programmed to make the experience realistic.

In 2011, a study found people respond more realistically to VR than computer dilemmas, which will typically be used in military classroom ethics training. People panic more, make more mistakes, give a strong emotional reaction and are more willing to commit harm for the greater good. This is because people respond to VR as though they are real events, particularly in comparison to films or images. VR would provide the military with control to adapt the simulations, measure and replay responses, and train personnel without engaging in real harm.

The US armed forces have already developed VR tools that teach tactical decision-making. It allows them to train in dangerous situations without actually putting the individual or equipment at risk. For instance, psychologists worked with the army to adapt the game "Full Spectrum Warrior" to clinically treat PTSD veterans returning from Iraq. The tool is also used pre-combat to screen for soldiers susceptible to PTSD. Despite the



Photo: US Army

US and Canadian soldiers are working together through the Military Oriented Protective Posture decontamination process during Exercise Maple Resolve 2018, Wainwright, Alberta, Canada in May 2018.

game being criticised for lacking realism, feedback can improve other VR tools. This indicates a willingness by the military to use VR tools, which could be extended to ethics training.

Additional hardware equipment can be used alongside the VR device to support training. Studies trialling VR have measured autonomic arousal which is the body's biological response to a threatening environment. This is measured by attaching electrodes to the second and fourth fingers of the non-dominant hand to transmit skin conductance. High levels of arousal suggest a strong emotional reaction, which indicates the realism of the simulation, and how much the soldier's decisions are being influenced by emotions.

A further hardware tool that could be used alongside the VR, is inputting harsh noise into the simulation to induce negative emotions such as anger. A 2014 study found harsh noise successfully caused a negative emotional response, as demonstrated by an increase in pupil diameter. Pupillometric measurements indicate autonomic arousal in a similar way to skin conductance. The advantage of this measurement is better resolution and an ability to measure which parts of the simulation the trainee focuses on and for how long. This shows which factors drive the moral action. An eye-tracking machine is a hardware system required for pupil measurements, and it uses an infra-red camera to detect the presence, attention and focus of the eyes. They can be head-mounted onto glasses to allow free movement which is useful for making the simulation naturalistic. Interestingly, inputting harsh noise caused participants to kill more avatars. This implies moral violations in combat become more likely as the environment becomes harsher. This reinforces the need to better prepare soldiers for moral conflicts in challenging conditions.

The hardware and simulation systems outlined in this article simply improve the realism of ethics training and reduce the costs associated with large scale simulations. A thorough, evidence-based plan for how to train moral reasoning skills using these systems is still required. If the army is seriously committed to delivering effective ethics training, it needs to move beyond simple classroom training, and improve soldiers critical thinking skills in rapid, threatening environments by utilising technological innovation. ■



Photo: Joint Forces

French soldiers defend a simulated village using Canadian weapons during Exercise Maple Resolve 2019.

The Bangladesh Navy – An Available, Adaptive and Affordable Force

Photo: Guy Toremans



The Bangladesh Navy has witnessed phenomenal growth in past three decades. It is evolving into a truly three-dimensional navy capable of maintaining an effective posture across the full spectrum of any conflict at sea. Notwithstanding the fact that the Navy has already made significant investments, there is still a need for new equipment as the Navy faces major challenges as many of its ageing units are in urgent need of replacement. ESD had the opportunity to talk to Rear Admiral Mohammad Musa, Commander Khulna Naval Area (COMKHUL).

When Bangladesh gained independence from Pakistan on 26 March 1971, the navy consisted of only two armed river patrol boats. Today, its inventory stands at more than 100 ships and craft and some 22,000 personnel. Bangladesh has a 710 km coastline along the Bay of Bengal with the principal ports of Chittagong and Mongla and, having settled its maritime boundaries with Myanmar in 2012, and India in 2014 via international arbitration, a sovereign claim over an exclusive economic zone (EEZ) of 118,813 km². Bangladesh also has one of the largest inland water transport networks in the world,

covering a total length of some 24,000 km with river ports at Dhaka, Narayanganj, Chandpur, Bhairab, Barisal, Chittagong, and Khulna and minor 21 inland river ports. The Navy Establishments and assets are spread over three regions: the Dhaka Naval Area, the Chittagong Naval Area, and the Khulna Naval Area. The Naval Headquarters are located in the country's capital Dhaka and includes the establishments BNS Haji Mohsin, BNS Sheikh Mujib, and the Naval Unit Pagla. The main naval bases are located in Chittagong, 250km south east from Dhaka, and Khulna 270 km south west of Dhaka, and Kaptai 60 km east of Chittagong.

A new base, BNS Sher-e-Bangla, is under construction in Patuakhali in southwestern sector of Bangladesh. It will become the navy's largest naval base with ship berthing and aviation facilities. A separate submarine base, BNS Sheikh Hasina, is also under construction near Kutubdia Island.

The navy's training establishments are the Bangladesh Naval Academy, BNS Issa Khan in Chittagong; the New Entry Training School, and the School of Logistics and Management in Khulna located in BNS Titumir, and BNS Shaheed Moazzam at Kaptai, in the Rangamati Hill District.

ESD: Admiral Musa, I had the honor to meet you at the 12th Regional Seapower Symposium in Venice. What is the value of the RSS for the Bangladesh Navy?

Admiral Musa: Nowadays, as transnational maritime challenges are becoming more diverse, complex, unpredictable, and intertwined, cooperation between navies is imperative. So we need the integrated approach to ensure our maritime security. The 12th Regional Seapower Symposium brings together allies and partners who desire to strengthen international security and stability. This symposium is an excellent platform for an open and constructive exchange of ideas and generates maritime awareness, and highlight the need for a shared approach to ensure peace and prosperity.

ESD: As the Commander Khulna Naval Area can you provide some details about your command?



Photo: Guy Toremans

BNS SAMUDRA JOY, the former US Coast Guard cutter USCGC JARVIS, transferred on 23 May 2013

Admiral Musa: As Commander Khulna Naval Area, I deal with all maritime activities of Bangladesh's south and south-western region, and assure the security of the country's two major sea ports Mongla and Payra. The Khulna Naval Area is the navy's western naval command, headquartered in BNS Titumir in the city of Khulna. BNS Titumir, one of our navy's largest bases, is home port to numerous naval units and houses several naval establishments such as the School of Logistics and Management, and the New Entry Training School [a boot camp for new recruits]. We are also responsible for the administrative and logistic support to all our navy ships, the Khulna Shipyard and the Mongla and Payra Port authorities.

ESD: Looking at the Bangladesh Navy in general, what are its tasks and missions?

Admiral Musa: The Bangladesh Navy (BN) plays a central role in safeguarding the nation's sovereignty and interests in the maritime domain. Our primary tasks are to patrol the territorial waters, ensure our rights over the Exclusive Economic Zone (EEZ) and Continental Shelf; keep the Sea Lines of Communications (SLOC) and our ports open; protect the fishing fleet; conduct Maritime SAR-operations; carry out oceanographic surveys; provide disaster management and humanitarian assistance & disaster relief (HA/DR) in the event of natural disasters (floods, cyclones, tidal waves, earthquakes), and any other task for which the government may deem it necessary to deploy the navy. The increased use of the maritime domain for illegal fishing, smuggling illegal drugs and other illicit traffic, considerably augmented our commitments. And with the settlement of maritime boundary delimitations with our neighbours [India and Myanmar], and the introduction by our government of the 'Blue Economy' Programme, our tasks increased even further. This 'Blue Economy' initiative aims at turning the Bay of Bengal into a hub of economic development and to effectively utilise the marine resources through the conservation and efficient use of the resources of the sea. Obviously, this implicates the reliance on the navy to lead many of these national maritime issues in order to protect our maritime interests and coordinate the Blue Economy Activities.

ESD: The national and the international environment are characterised by the increase of asymmetric threats at sea. Does your navy has sufficient assets to comply to all its commitments?

Admiral Musa: In the past decade, the Bangladesh Navy has mustered adequate



Photo: Guy Toremans

BNS SHADINHOTA, the leadship of the four newly-built SHADINHOTE class (Type C 13B) corvettes



Photo: Guy Toremans

BNS SANGU, the ex-Royal Navy ISLAND class offshore patrol vessel HMS GUERNSEY, was transferred in October 2004.

assets to carry out its mandated tasks and we are working to improve our capabilities even further. Our Government is very supportive to develop a credible fleet, with robust and dynamic support structures, as well as a skilled and motivated workforce. Its "Forces Goals 2030 Initiative", introduced in 2011 and being revised periodically, represents a major qualitative and quantitative improvement of our capabilities, turning the Bangladesh Navy into a credible three-dimensional force.

ESD: Can you give us a rundown on your navy's procurement programmes? What projects are being carried out and which are in the planning stage?

Admiral Musa: In the past decade, we acquired two ex-Chinese JIANGHU III class frigates (BNS ABU BAKR and BNS ALI HAIDER in 2014); and the two JIANGWEI II class frigates (BNS OMAR FAROOQ and BNS ABU UBAIDAH) in Janu-

ary 2020; four newly-built SHADINHOTE class corvettes (BNS SHADINHOTA and BNS PROTTOY in 2016, and BNS SHANGRAM and BNS PROTASAH in 2019), two Chinese MING class diesel electric submarines (BNS NABAJKATRA and BNS JOYATRA) submarines, two helicopters from Italy (Agusta Westland 109E 'POWER') in 2011, four LCU type landing craft in 2015 and two maritime patrol aircraft from Germany (Dornier 228NG) in 2013. At the same time, we are also developing a sustainable local shipbuilding capability. Our shipbuilding infrastructure is being upgraded in order to build up to frigate-sized vessels and carry out the maintenance of all our units in-country. On order are a second batch of five PADMA class patrol vessels, and two more MPAs from Germany. On the longer term, we are looking into the replacement of our BNS OSMAN (ex-Chinese JIANGU II class) frigate and the six ex-RN ISLAND class

Photo: Bangladesh Navy



One of the navy's two Agusta Westland AW 109F helicopters

offshore patrol vessels, as well as into the procurement of new mine countermeasure vessels, logistic ships, and additional helicopters and MPAs.

ESD: Drones are a major game-changer in maritime surveillance. Do you plan to acquire drones?

Admiral Musa: Indeed. The Bangladesh Navy Centre for Research & Development has already produced indigenously built drone for targeting practices, and is also working on research to manufacture drones and UAVs to carry out surveillance and monitor coastal and offshore activities.

ESD: Partnerships and international co-operation became a necessity. How would you assess the level of interaction and co-operation with other navies?

Admiral Musa: The motto of our foreign policy is "Friendship to all, malice to none". The BN is a trusted regional partner and maintains strong relationships with many

navies in the region and beyond, in order to effectively counter common threats at sea. We undertake a wide range of cooperative initiatives, such as bilateral and multilateral exercises at sea, joint training and capability building programmes. And we are engaged in various initiatives like the Indian Ocean Naval Symposium, the Western Pacific Naval Symposium, and the Regional Seapower Symposium. Some of our officers and sailors undergo training in Canada, China, France, Germany, India, Italy, Japan, Malaysia, Singapore, Turkey, the UK, and the US. Likewise, personnel from India, the Maldives, Qatar, and Sri Lanka receive training at Bangladesh Navy Training Establishments. We do regularly deploy assets 'out-of-area', i.e. our ships have been operating in Multinational Task Force in UNIFIL (United Nations Interim Force in Lebanon) in the Mediterranean Sea since 2010. And we also support international HA/DR operations, such as in the Maldives in 2014, the Philippines in 2013 and in Colombo after cyclone "Roanu".

ESD: What do you think is needed for an effective approach to counter the arising threats and challenges?

Admiral Musa: Today, maritime threats have become widely diversified. We need to share information and help each other by identifying and combatting these threats, not only to ensure safety and security at sea, but also to reduce any misperceptions of a situation in order to avoid an escalation. It helps to develop a right perception on the threat and the measures to be taken by both maritime agencies on either side. A good example is the introduction of the coordinated patrols (CORPAT) in June 2018, with our frigate BNS ABU BAKR and the offshore patrol vessel BNS DHALESHWARI, and the Indian Navy deploying the SHIVALIK class frigate INS SATPURA and the KAMORTA class corvette INS KADMATT. For the second edition, in October 2019, we took part with our frigate BNS ALI HAIDER, the corvette BNS SHADINOTA and a SWAD Team; the Indian Navy with the destroyer INS RANVIJAY, and the corvette INS KUTHAR.

These of CORPAT-patrols represent a significant improvement in countering transnational maritime threats and in our naval relations

ESD: Which role does your navy play in the war on terror and counter-piracy operations?

Admiral Musa: We seek to shape a favourable and positive maritime environment towards preserving peace, promoting stability, and maintaining security. Our contribution in the war on terror and the counter-piracy operations has been appreciated for many years now. Together with the Bangladesh Coast Guard, we continuously patrol the northern Bay of Bengal and



Photos: Bangladesh Navy



The ex-Chinese MING class submarine Nr. 356, renamed BNS NABJATRA

have succeeded in drastically reducing piracy, armed robbery and petty theft. And we are a proud member of elite maritime task force of the UN. We have been participating in UN missions since 1993, such as the UNIKOM post-Gulf War I in 1997 to patrol in the waters of the Iraq-Kuwaiti border, the Force Riverine Unit in UN Mission UNMISS in Sudan in 2005 until 2012, a Boat Detachment in Ivory Coast, and operated for 11 years off Abidjan between 2005 and 2016, and, since 2010, in the UN Maritime Task Force in Lebanon UNIFIL.

ESD: Cyber defence is becoming a priority in all military domains, not least for navies. What are the major cyber threats for the BN?

Admiral Musa: The Government takes the cyber threat very seriously and launched a comprehensive effort to strengthen our cyber defence. Otherwise, cyber-attacks will increasingly become harder to detect and even more difficult to counter. As we are becoming increasingly dependent on connectivity and digitalisation, the vulnerability of the ships and their systems will increase. Therefore, we need new capabilities, more surveillance and an integration of both national and international resources. We are improving our cyber situational awareness and working to acquire necessary expertise and capabilities.

ESD: People are the key element in naval forces. Many navies in the world are facing retention problems. Is this problem affecting your navy and what challenges does your navy face when recruiting and retaining people?

Admiral Musa: Today the people of Bangladesh have a greater expectation about quality of life to be rendered to them. Consequently, we are taking the necessary steps to improve our quality of life, work, and leadership. Job satisfaction leads to better productivity, retention and efficient performance. The navy provides education, professional training, post-retirement job opportunities, and family support in case of injury or loss of life during service. Our welfare schemes are comparable to those in the private and civil sector.

ESD: What will be the greatest challenges the BN will have to face in coming years?

Admiral Musa: The maritime domain is central to our security and prosperity, so it's essential that we prepare for a wide



Photo: Bangladesh Navy

BNS SAMUDRA JOY, the former US Coast Guard cutter USCGC JARVIS, in the Chittagong Dry Dock (CDD)



Photo: Bangladesh Navy

Naval Headquarters of the Chittagong Naval Area

range of contingencies. The modernisation and enhancement of the Navy's capabilities is an on-going process to meet emerging maritime challenges and threats.

Like most of the world's navies, we face a wide array of challenges. Work is ongoing in how we can overcome these through acquiring state of the art platforms, development information technology and digital transformation, indigenous development and self-reliance, enhance surveillance and cyber security, utilisation of artificial intelligence (AI), and recruiting and training skilled human resources.

ESD: What is the way ahead for the Bangladesh Navy?

Admiral Musa: The Bangladesh Navy is well on course to become a credible three-dimensional force. As aforementioned, the introduction of a series of new platforms with much greater endurance and capability will allow us to increase our capabilities on, below and above the surface. Modernisation, efficient manning, and self-reliance will remain the key driving factors for our innovation process. I dare say that we are becoming a credible and self-sustained maritime force, well-suited to meet today's and tomorrow's national and regional needs. We are an 'Available, Adaptive and Affordable force', always ready to meet the aspirations of our nation.

The interview was conducted by Guy Toremans.

Special Operations Ground Vehicles

Sidney E. Dean

Demands placed on SOF will continue and it will drive demand for more sophisticated and varied SOF vehicles. Developments which are considered the cutting edge of today's research will become the norm over the next one to two decades.

Despite the recent trend to focus more on major power conflicts, the demands placed on SOF will continue to increase for two reasons. First, the increase in tensions between the US and its allies versus Russia or China will do nothing to reduce the number and intensity of nonconventional conflicts in the world; on the contrary – Russia and other state actors such as Iran will only increase their support for insurgencies in order to force the US and its allies to divert military resources there. Secondly, any conflict with Russia or China will require a large scale deployment of SOF to conduct reconnaissance and sabotage operations in support of conventional forces. These developments will drive demand for more sophisticated and varied SOF vehicles.

Developments include: lighter-weight but resilient materials to reduce the weight of the base vehicle and of armour while ensuring occupant safety (and reducing the likelihood that the vehicle will be incapacitated by a single hit); "stealth" attributes such as coatings to reduce vehicle visibility to optical and infrared sensors as well as to laser targeting systems; hybrid drive to enable silent and low-thermal-signature approach to target; more efficient engines to increase range without resupply; on-board power generation capable of feeding sophisticated weapon systems including lasers, electronic warfare systems, and perhaps even railguns; the ability to carry and control unmanned reconnaissance and strike systems (both aerial and ground). Another major area of interest: remote operability and full-scale autonomy. Advantages would include allowing dismounted forces to use their vehicle as a scout, a fire support platform or a distraction during an assault or extraction. Alternately, SOF preparing for prolonged dismounted operations could send their vehicle back to a safe location or to echelon to prevent its detection, then summon it for extraction.

Photo: Polaris



The Polaris DAGOR's suspension is based on desert racing vehicle technology.

Photo: US Army



Soldiers rig the Ground Mobility Vehicle 1.1 (GMV 1.1) to assess its suitability for aerial delivery with current parachute systems, rigging materials, and rigging procedures. The GMV v1.1 supports tactical operators in both urban and non-urban environments across the full range of Special Operations Forces (SOF) military operations and terrain profiles.

North America

The United States armed forces maintain the largest special operations community in the Western world. The joint US Special Operations Command (USSOCOM) develops, procures, and operates a variety of vehicle types which together comprise the Family of Special Operations Vehicles (FOSOV). This family includes the medium weight Ground Mobility Vehicle 1.1 (GMV 1.1), the Light Tactical All-Terrain Vehicle (LTATV), and the Non-Standard Commercial Vehicle (NSCV). In addition to these currently operational types, USSOCOM is researching and developing upgraded or new vehicle classes to augment the fleet.

Ground Mobility Vehicle 1.1

USSOCOM took delivery of the first GMV 1.1 in 2015. The initial procurement plan calls for delivery of 1,297 units through August 2020. The vehicle is being built by General Dynamics on the basis of that firm's Flyer 72. The modular vehicle can be customised according to mission requirements which range from deep reconnaissance to strike missions. Various enclosed and open-top configurations are available. Depending on configuration, accommodation ranges from three to nine operators. The GMV 1.1 features an enhanced vectronics capability ready to plug into current and future battlefield networks. The 5.33-metre-long vehicle has a curb weight of 3,100 kg. Payload capacity is rated at 2,800 kg. Occupant protection includes an integrated



Photo: US DoD

A team of paratroopers assigned to the 1st Battalion, 325th Airborne Infantry Regiment, 2nd Brigade Combat Team, 82nd Airborne Division, practice a tactical halt with the brigade's new Light Tactical All Terrain Vehicle on Fort Pickett, Va., in February 2015. The 1st Battalion, 325th AIR developed tactics, techniques and procedures for tactical movement with the new LTATVs. The battalion is currently assessing the LTATV as a platform to provide a rifle company with rapid mobility in support of airfield seizure operations.

rollcage which can withstand 100% of vehicle weight, preventing a turned-over GMV crushing the crew. External storage boxes on all four passenger doors enhance storage capacity while simultaneously adding to ballistic and blast protection. Standard armament configuration includes a central ring mount with a choice of 12.7mm machine gun, 7.62mm minigun, or 40mm automatic

grenade launcher, although the vehicle can accommodate a 30mm cannon.

Mobility attributes include the ability to climb a 60% gradient and master a dynamic side slope of 40 degrees. Road speed tops at 120 km/h, with a cruising range of nearly 500 km at mission profile, or 800 km on flat ground at 70 km/h cruising speed. The GMV 1.1 can be internally transported by fixed wing tactical aircraft and helicopter, with (depending on configuration) up to two vehicles fitting inside a CH-47; a single vehicle can be sling loaded beneath a UH-60 BLACKHAWK helicopter.

The Pentagon plans to continue procurement of the GMV 1.1 past the current contract. Beginning this fiscal year, USSOCOM will also begin pursuing improvements to the GMV 1.1. Of foremost interest is introduction of a hybrid propulsion system that would allow operators to switch to electric drive when approaching a target. USSOCOM is planning to issue a Request for Proposal (RfP) during the first quarter of Fiscal Year 2021 (FY 21), i.e. between October and December 2020. Contract award is tentatively scheduled for the first quarter of FY 22.

Light Tactical All Terrain Vehicle

Currently, the LTATV role is filled by the Diesel-fuelled Polaris MRZR-D in both a two-seat and four-seat variant; the latter has a payload capacity of 680 kg and can actually carry up to six combat-ready soldiers or four soldiers plus two litters. The



Photo: US Air Force

A US Air Force combat controller, 21st Special Tactics Squadron, loads a Polaris RAZOR all-terrain vehicle onto a C-130 HERCULES on Hurlburt Field, Fla., in April 2015. "Emerald Warrior" is the Department of Defense's only irregular warfare exercise, allowing joint and combined partners to train together and prepare for real world contingency operations.

Photo: Polaris



The DAGOR can transport up to nine troops plus gear, but for some special operations mission the standard crew consists of 4-5 soldiers.

transition to Diesel was made in 2018 because of the 80% greater operational radius when compared to the previously used gasoline variant MRZR. The highly mobile vehicles measure 287 and 356 centimetres respectively, and have curb weights of 856 and 953 kg, enabling internal carriage by helicopter. The LTATV will reach the end of the initial procurement cycle this year. A follow-on open procurement competition for

additional LTATV is planned, with contract award expected in early FY 21. Current upgrade research is focused on reducing the acoustic signature of the vehicles as well as adding a hybrid propulsion system. According to FOSOV deputy programme manager Logan Kittinger, the LTATV has also been targeted to become the first special operations vehicle capable of autonomous operations by circa 2030. USSOCOM plans to

introduce that capability for resupply and casualty evacuation as well as extraction of forward-operating forces.

Non-Standard Commercial Vehicle

The term NSCV refers to SUV and pick-up-truck style vehicles based on various consumer-grade brands. Externally indistinguishable from the commercial models, these vehicles allow SOF personnel to blend in with the civilian populace. The Battelle Memorial Institute in Ohio has the current contract (through 2023) to convert the vehicles to military specifications. Battelle's ground vehicle team takes existing vehicles, reengineers them with protective armour and adds other durability features, such as reinforced chassis, enhanced brakes, stronger suspensions for operations in rugged terrain, and enhanced alternators to withstand extreme climates. Military grade vectronics, communications systems and electronic countermeasures are also frequent elements of the upgrade.

While the NSCV helps personnel blend in, the armour and other military systems add up to 4,500 kg of weight, considerably reducing the commercially built vehicle's service life to a mere 3-5 years. USSOCOM hopes to procure more durable vehicles which still look like the commercial designs but are purpose built for military requirements. These Purpose-Built Non-Standard Commercial Vehicle will feature improved performance, a better weight-to-power ratio and a lifecycle approaching 10-15 years. Production of purpose built NSCVs is expected to begin as early as this year, and will – for the time being – run parallel to continued procurement of commercially built NSCVs. Research for future improvements focuses on the development of lighter weight armour (including transparent or opaque materials); a common chassis and drivetrain including a lower cost, lightweight wheel assembly that is run-flat compatible; and modular exterior elements which allow modification of vehicle silhouette and colour.

Photo: SupaCat



In 2017 SupaCat introduced a new variant of the HMT, the HMT 400 DESERT. "HMT 400 DESERT has been adapted to enhance performance in the desert's harsh environment and climatic conditions. It has no armour and the lighter gross vehicle mass improves the power-to-weight ratio and increases mobility over deep desert sand. Further desert features include cooling, a central tyre inflation system and lightweight bead locks to enable the vehicle to be operated at the lowest tyre pressures."

Armoured Ground Mobility System

USSOCOM plans to replace its current, 30-year-old heavy armoured personnel carriers with a next generation Armoured Ground Mobility System (AGMS). Requirements are still being finalised, but will likely include: a ten-person transport capacity; C-130 compatibility; and better ballistic and blast protection than that of USSOCOM's current MRAP AGMS. The acquisition programme is expected to launch in FY2022 or FY2023. According to Logan Kittinger, DoD might resort to an OTA (Other Transaction Authority) agreement to contract for

2020

EUROSATORY

08-12 JUNE 2020 / PARIS

THE UNMISSABLE
WORLDWIDE
EXHIBITION



1,802

exhibitors



+14,7%

from 63 countries
65,9% of international

65 startups at Eurosatory LAB

98,721

Total attendance

(exhibitors, visitors,
press, organisers)

227

Official delegations

from 94 countries
and 4 organisations
(representing 760 delegates)

696

journalists

from 44 countries

75 Conferences

2 102 Business meetings made



2018 key figures

Photo: NL MoD



The Dutch commandos received the first of 50 Versatile Expeditionary Commando Tactical Off Road (VECTOR) SOF vehicles in December 2017.

Photo: Defenture



Defenture's ATTV (Air Transportable Tactical Vehicle) serves with the Dutch Army and Marine Corps commandos under the designation VECTOR.

Photo: German MoD



The SERVAL LIS (SO) firing the 12.7mm machine gun.

prototypes; the OTA is a relatively recent instrument which allows the Pentagon to minimise bureaucracy and speed up contracting for vital equipment and services.

Polaris DAGOR

The Polaris DAGOR introduced in 2014 falls midway in size between the GMV 1.1 and the LTATV. While not officially part of the FOSOV, it was designed to meet criteria expressly demanded by USSOCOM, and has been purchased in limited quantities for US Army airborne forces as well as allied services. This includes the Canadian Special Operations Forces Command which ordered the DAGOR in 2016 to fulfil the Ultra-Light Combat Vehicle role; the first vehicle was delivered in early 2018.

The 452-centimetre-long vehicle has a gross weight of 3,860 kg and a payload capacity of 1,815 kg. The vehicle seats up to nine combat-equipped soldiers: four in forward facing seats, the remainder in rearward seats, with a sling seat for the central gunner's position. A large choice of weapons is available, including a 12.7mm machine gun in the permanently fixed central ring mount, plus smaller calibre guns on side-mounted pintels.

Mobility is the central concept around which the unarmoured DAGOR was built. The open-topped vehicle has no doors, facilitating immediate egress and mounting. It can be internally transported via CH-47 (up to two vehicles) or CH-53; sling-loaded via UH-60; or low-velocity airdropped from fixed-wing aircraft. Vehicle range is 800 kilometres with an on-road speed of 135 kph. The suspension is inspired by off-road racing technology, giving the DAGOR excellent handling on all terrain. In 2019, Polaris introduced the next generation DAGOR A1.

Europe

SupaCat HMT

Britain's SupaCat produces one of the largest and heaviest SOF vehicles. The HMT (High Mobility Transport) EXTENDA resembles a fire truck rather than typical high-mobility vehicle. Specifically designed for SOF, it is in service with six nations including the UK (which acquired the original HMT 400 for the SAS in 2007) and Norway, which acquired its vehicles in 2018-2019. The EXTENDA is available in 4x4 and 6x6 configurations. Length and curb weight register at 580 centimetres and 4,900 kg, or 705 centimetres and 5,900 kg respectively. Width (205 centimetres), minimum/maximum vehicle heights (188.5/224.5 cm) and minimum/maximum clearance (18.0/48.5 cm) are the

same for both configurations. The HMT is agile for its size, mastering a 60% gradient and a 32-degree side slope, as well as approach and departure angles of 40 degrees and a ramp-over angle of 150 degrees. Fording depth without preparation is 100 centimetres. The turning circle ranges from 13.5 to 17.5 metres. Maximum range on internal fuel is 1,000 kilometres, with a top speed of 120 kph. The EXTENDA is a modular vehicle which can be reconfigured over the course of the service life in order to meet changing requirements. Modular blast and ballistic protection packages are available, as is a wide range of other optional equipment. Weapons load can include several machine guns, grenade launchers, and javelin missiles. The vehicle can be sling loaded under a CH-47, or internally transported by C-130, M400 or C-17 class aircraft.

Defenture ATTV/VECTOR

The Dutch firm Defenture was founded in 2013 as an R&D startup, and by 2017 transitioned into manufacturing vehicles for special operations forces as well as for special mission police units and disaster-relief agencies. The common GRF 5.12 chassis forms the core of Defenture's Ground Force Vehicle, which is available in four configurations: combat, pickup truck, logistics truck (with an enclosed cargo shell) and ambulance. The GRF 5.12 platform features a rugged central spine chassis suitable for all-terrain operations. It features an independent rear suspension and optional four-wheel independent

Credit: German MoD



The SERVAL LIS (SO) with the top mounted 12.7mm machine gun and 7.62mm MGs mounted fore and aft

ent steering; a multi-fuel engine capable of running on Diesel or aviation kerosene; and multiple tie-down points to facilitate vehicle transport by rail, sea, and air, including sling transport by helicopter. The Ground Force Vehicle is certified for operations between -40 and +49 degrees Centigrade. The basic curb weight is 2,450 kg, with a maximum payload of 2,150 kg and a range of 1,000 kilometres. The ATTV (Air Transportable Tactical Vehicle) is a further development of the Ground Force Vehicle. It entered service with the Dutch army's commando regiment in late 2017, and was subsequently also provided to the Netherlands marine corps' special operations unit. The Netherlands SOF officially designated the vehicle as the VECTOR (Versatile Expeditionary Commando Tactical Off Road).

The last of the 75 purchased units will be delivered to the Dutch special operations command in April 2020.

The ATTV is 510 centimetres long, has a curb weight of 3,000 kg, and a payload of 1,440 kg. It seats a standard crew of five, and mounts two machine guns including a ring mounted 12,7mm weapon. The 4x4 vehicle has an operational range of 800 kilometres, and is suited for special reconnaissance patrols and interdiction/strike missions. The turning circle is 13.5 metres with standard steering, or 9 metres with optional four-wheel steering. Modular ballistic and mine armour up to STANAG Level 1 is available. The vehicle can be air-lifted as a sling load or inside a CH-47.

Rheinmetall SERVAL LIV (SO)

The SERVAL Light Infantry Vehicle – Special Operations (LIV-SO) was developed by Rheinmetall on the basis of the militarised Mercedes Benz G-Class, but features a longer wheelbase. It is specifically tailored for the requirements of SOF (including long-range reconnaissance missions and strike missions), and was acquired by the German armed forces for the special operations command (Kommando Spezialkräfte – KSK) beginning in 2003. The 4x4 vehicle is combat proven in a variety of challenging climate zones and terrain environments including Afghanistan. Capabilities include mastering a 60 percent gradient, 30-degree side slope, 50 centimetre trench, and a 60 centimetre ford. The 4.89-metre vehicle has a curb weight of 3,300 kg and a payload capacity of 1,200 kg. The vehicle can be internally transported by CH-53 helicopter. The SERVAL accommodates four soldiers, and carries sufficient supplies to keep the team in the field for prolonged reconnaissance and surveillance missions. Operational range is 800 kilometres, with a top



Photo: Krauss-Maffei-Wegner

The KMW Special Operations Vehicle

Photo: Arquus



Arquus' PATSAS is based on the BASTION armoured personnel carrier.

speed of 120 kph. The body and floor are lightly armoured but the vehicle is open-topped and has no doors; this minimises weight while enhancing field of view and dismount speed. A cloth top can be added for sun protection. Protective panels can be temporarily mounted around the body and engine compartment, and the windscreen can be replaced with bullet-proof glass.

The SERVAL is known for excellent terrain handling. Armament options include either a 12.7mm machine gun or 40mm automatic grenade launcher on the ring-mounted Rheinmetall 609K weapon station, augmented by two 7.62mm ma-

chine guns mounted fore and aft. The 609K is stabilised to maintain accurate fire while moving over uneven terrain. A smoke dispersal system is integrated into the front and rear bumper area. GPS and satellite links promote navigation, communications, and situational awareness.

KMW Special Operations Vehicle

The first prototype of Krauss-Maffei-Wegmann's Special Operations Vehicle (SOV) was presented in 2014. The 4x4 light armoured vehicle was designed in cooperation with Italy's Bremach, which supplied the heavy-duty chassis. Its primary mission profiles cover special operations and long-

range reconnaissance. Features include ballistic protection, a mine protected undercarriage, and elevated crew seats for further protection from IEDs. The five-metre-long vehicle has a curb weight of 5,000 kg, and can be configured to match the user's requirements. It is available with an open top, an enclosed and protected cabin, or as an armoured pickup or flatbed truck. Depending on configuration it can accommodate three to six troops including the driver. The primary weapon is either a 12.7mm machine gun or a 40mm machine grenade weapon on a ring mount; it can be augmented by up to two pintle mounted 7.62mm or 5.56mm machine guns front and aft. Optionally, the SOV can mount a remote-controlled weapon station, as well as the Wegmann 76/40mm grenade launcher for smoke and other obscurants. A five-ton winch with a 25-metre steel cable for self-recovery is standard.

At 2,500 kilos, the payload is larger than standard for vehicles of this class. The SOV is highly mobile on all terrains, and achieves 130 km/h road speed. Operational range is circa 1,000 kilometres. The vehicle can be airlifted internally by CH-47 or CH-53 with weapons in place, enabling immediate combat readiness after unloading.

Arquus

French manufacturer Arquus designates four of its vehicles as SOVs. The 4,200 kg AREG 4x4 light tactical vehicle is specifically designed for SOF deep penetration missions. The vehicle can be airdropped, making it ideal for commando-style strike missions in hostile territory or far from friendly bases. The modular body can feature an enclosed or open passenger cab accommodating four soldiers. A ring mounted 12.7mm machine gun and a 7.62mm MG on an articulated arm by the commander's seat constitute the standard armament.

The 11-tonne SABRE is utilised by SOF in a large number of countries, especially in the Francophone world. Arquus defines it as a multi-echelon and joint combat vehicle. The SABRE's size enables high endurance and long-range missions deep behind enemy lines; range is augmented by the ability to carry additional fuel tanks. The central ring mount is augmented by three additional weapons mounts, allowing the five-person crew to maintain a 360-degree arc of fire. In addition to machine guns and grenade launchers, the SABRE can be equipped with anti-tank or anti-personnel missiles. A wide range of communications systems can also be installed, enabling the weapon to be used

Photo: DS Raider



In Europe the DS Raider HD4 and its civilian counterpart, the EZ Raider, are marketed through BSS Defence & Security Solutions in The Netherlands.

Bren-Tronics' Innovative Lightweight Lithium-Ion 6T 24 V Battery

Bren-Tronics developed the most powerful 6T Lithium-ion battery on the market in 2015, addressing the three basic requirements of military vehicle manufacturers and customers: energy, weight and space. This 24 V battery replaces two current batteries for one quarter of the weight and half the space and provides all the power needed for starting the vehicle and for silent watch missions.

This silent solution is ideal to power all the required systems (comms, sensors, electronic warfare systems, etc...) that are characteristic of lightweight ground vehicles, avoiding the use of generators or the vehicle's own cranking batteries. Their use will enhance greatly the mobility and autonomy of such vehicles, and Bren-Tronics is partnered with various vehicle manufacturers globally and in Europe to integrate such technology in order to enhance the platform's energy reserve.

Photo: Bren-Tronics



The BRENERGY 6T Li-ion battery is the most powerful battery on the market.

Responding to the needs of the market, late in 2018 a joint-venture of Bren-Tronics Inc. was founded in Turkey, Brensan Energy and Defence Inc. Brensan is a defence and security-oriented design department and production transfer centre for Li-Ion batteries. The Turkish facility manages various solution integration projects in vehicles that require mechanical, electrical and CAN-BUS communications interactions.

Bren-Tronics and Brensan provide reliable power solutions and our topmost concern is customer satisfaction. See more on Brensan on our website: www.brensan.com.tr Reliable power with you!

as a command or fire-control platform. The 12 tonne PATSAS is a variant of Arquus' BASTION armoured personnel carrier. In contrast to the BASTION, the PATSAS is specifically designed for SOF. Unlike the fully protected BASTION, the PATSAS has an open cab with two side doors and a rear door. The sides retain the heavy armour of the original vehicle, affording a higher level of crew protection than most SOF vehicles. The bullet-proof windshield consists of two panes, both of which can be folded down as re-

quired. Armament includes a ring mount capable of taking either a 12.7mm MG or an anti-tank guided missile. An additional three mounts can accommodate 7.62mm MGs. The standard crew consists of two soldiers in the cab and three in the rear. The 12 ton 4x4 TORPEDO is designed as an open-bedded truck. An enclosed driver's cab is optional. The heavy-duty off-road vehicle is designed for sturdiness and ease of maintenance in austere environments. Intended for autonomous operations, the vehicle can carry additional fuel tanks to

increase range. The weapons load mirrors that of the PATSAS and SABRE. In addition, the eight-person crew – six of whom ride in the open back section – can deploy communications scramblers and jammers.

Israel

DS Raider DH4

The DH4 developed by Israeli firm D.S Raider is considered a new category of SOF vehicle. The DH4 is an electrically powered four-wheeled all-terrain scooter which can carry up to two soldiers standing. It has a 76 centimetre wheelbase and a length of 170 centimetres. Maximum payload is 200 kg, although this can be augmented by up to 250 kg by attaching a motorised trailer with the same dimensions as the scooter. An optional seat can be installed to minimise rider fatigue over longer routes and its capacity is not limited to one soldier. Users can choose between a rear-wheel drive or a 4x4 variant. The suspension system provides each wheel with independent horizontal and vertical movement, maximising stability on broken terrain. Ground clearance of the baseboard is 25 centimetres. The scooter attains speeds up to 50 km/h and a range of 75 kilometres, depending on configuration, terrain, and payload. The battery functions within a temperature range of -20 to +80 degrees centigrade. Advantages include a silent approach to target, and the ability to traverse narrow terrain where few other vehicles except motorcycles can go. At 130 kilos curb weight, the DH4 can be carried on any standard sized vehicle; three can be airlifted with their crews internally via Blackhawk helicopter, ready to operate immediately upon roll-off. According to the manufacturer, only minimal training is required to operate the scooter. The DH4 is currently being evaluated by SOF in several countries ranging from the United States to Israel.

The Way Forward

Of course, engineering cannot be forced. Despite enhanced budgets for SOF technology research, fielding enhanced capabilities will take time, and will occur sequentially as progress is made. Hybrid drive and carriage of short-range UAVs are already in service on some vehicle types; enhanced materials, power systems and full autonomy will take longer. Yet it seems safe to say that the sons and daughters of today's special operators will command vehicles which are much more powerful and sophisticated than currently deployed systems. ■

Improved Individual Firepower

Jan-Phillipp Weisswange

Modernisation activities for firearm systems aim to increase the warfighter's individual firepower in terms of precision, range, lethality, reliability and rate of fire. They are also intended to improve ergonomics and reduce the weight of the combat load. Another aspect is the increasing digitisation of the battlefield.

Each individual firearm is a modular system and the infantry toolbox, therefore, a 'system of systems'. The firearm system includes the weapon itself, the associated ammunition range, optics and optronic attachments as well as other peripheral equipment, such as a bayonet, sling, magazines and magazine pouches, cleaning kit, and so on. In a broader sense, training is also part of the firearm system. Weapon families offer the advantage of largely identical operability and a high degree of parts uniformity. Although this has a positive effect on training and logistics, the family concept can usually only be consistently implemented in individual systematic groups of the infantry 'toolbox'.

To put it candidly, the procurement of a new firearm system is not limited to handing out more tactical guns to the grunts. Rather, it involves changes in the stocking of spare parts, peripheral equipment and ammunition. Furthermore, adjustments to maintenance and overhaul processes and technical documentation must also be taken into account. In addition, weapons, shooting, tactics and technical training (often including infrastructure) usually need modification. Particularly in larger organisations, such as armed forces, cross-sectional firearm systems are generally designed for long service life. New procurements are usually made only after profound technological and tactical knowledge has been gained or when a fielded system can no longer be sufficiently modernised or supplied. The latter happens because, incomprehensibly, not every state defines firearm as a 'key national technology'. Smaller organisations, on the other hand, can usually be a little more flexible and, for example, procure special solutions.

Author

Jan-P. Weisswange PhD is a communication manager in the defence industry. This article reflects his own personal opinion.



The NGSW-AR version of the RM277 fires True Velocity's ammunition with a polymer case.

Basically, the 'system of systems' approach offers three possibilities for modernising the stock of firearms: adaptation/upgrading of existing stocks, procurement of more modern systems on the market, or initiatives for the development of new system components or entire systems.

Adaption of Firearms in Stock

It was not until 2019 that Portugal's navy decided to make its G3 stocks more modularly expandable with new add-on parts from the Swedish tuning specialist Spuhr. Switzerland still issues the assault rifle 90 (SIG 550) as a personal weapon and the short assault rifle 04/07 (SIG 553) as corps material. As part of the Swiss 2019 armaments programme, almost 10,000 units of the Laser Light Module 19 (Rheinmetall Vario Ray) are now being phased in as combat upgrade. To be able to use these, minor modifications to the handguards of the weapons are required.

As early as April 2018, the UK Armed Forces had decided to retain the SA80 bullpup assault rifle, alias L85, originally developed by the Royal Small Arms Factory in Enfield, and to have it modernised by Heckler & Koch, as they had first done in 2000. Starting in au-

turn 2019, the upgraded SA80A3 variant is fielded. The improvements include a new assault grip, an improved upper receiver, additional safety functions and weight reduction measures. The modifications are carried out in Oberndorf, while system assembly is carried out at HK's UK subsidiary Nottingham Small Arms Facility in the UK.

The Austrian Armed Forces also remain loyal to a bullpup weapon, namely the Sturmgewehr 77 – alias Armee Universalgewehr (AUG). Its manufacturer – Steyr Arms – has constantly improved this product. The AUG A3 version with additional mounting rails and a new bolt release button is the starting point for the StG 77 A1 KPE (Kaderpräsenzeinheiten) and StG 77 A2 Kdo (Kommando) variants newly procured by the Army.

Photos: GD O15

Procuring Modern Systems on the Market

Like Austria, Australia is sticking with the bullpup system - but with a more modern model. Australia is replacing the AUSTeyr F-88 AUGS, manufactured under licence at Lithgow Arms (now part of Thales), with the new F90 version developed by Thales. Its designers placed a particular emphasis on weight reduction and improved ergonomics. This was expressed in a fluted barrel, a new bolt and a new combined receiver and barrel assembly. A bolt release lever similar to the one on the AUG A3 is intended to speed up tactical reloading, and a deflector on the ejection port is intended to optimise left-handed shooting. The F90 also includes a 40mmx46 grenade launcher, which can be quickly attached. The F90 is delivered to the troops as enhanced F-88 (EF-88).

China and France, on the other hand, turned away from the bullpup design. The first units of the Chinese People's Liberation Army paraded in 2019 on the 70th anniversary of their state with allegedly QBZ-191 named gas-operated short stroke piston rifle in classical architecture. Like the previous standard weapon QBZ-95, it is chambered for calibre 5.8mm x 42, but in more modern laboratories. In September 2016, the Poilus decided to replace the FAMAS with the HK416F. Since 2017, 107,000 rifles have been procured in two configurations: 'S' (standard) and 'C' (Commando, 11" barrel). In addition, there are 10,767 HK269F grenade launchers. At the beginning of 2020, two more modernisation decisions were taken on the Seine. For example, 2,620 FN SCAR-H PR will be added as a semi-automatic precision rifle (Fusil de précision semi-automatique) and a variant of the



Photo: VBS

Swiss combat upgrade: LLM19 on assault rifles 90 (l.) and 07 (r.)

Glock 17 Gen 5 as Pistolet Automatique de Nouvelle Génération (PANG). In total, the Poilus will receive 74,596 pistols. The scope of supply includes matching holsters (BLACKHAWK T-Series), 7,000 silencer kits, 15,000 laser light modules, 9,000 training weapons, 45 million cartridges with full metal jacket bullets, two million cartridges of subsonic ammunition, four million cartridges of marking ammunition and other accessories. The Czech company Sellier & Bellot was chosen as the ammunition manufacturer. The training kits come from Ultimate Training Munitions.

Portugal is currently modernising, among other things, clothing and personal equipment as well as its stock of firearms as part of the 'Sistemas de Combate do Soldado' project. As recently as February 2019, Portugal commissioned FN

Herstal to supply FN SCAR assault rifles and FN Minimi MK3 machine guns in 5.56mm x 45 and 7.62mm x 51 as well as FN40GL grenade launchers. This procurement process was initiated through the NATO Support and Procurement Agency (NSPA). A new service pistol is also being procured through the NSPA. The Portuguese also chose a version of the Glock Gen 5.

The US Armed Forces and Denmark introduced the SIG Sauer P320 as a new service pistol. The US project 'Modular Handgun System' is one of the largest of its kind. Here, 280,000 P320 Full Size (M17) and 231,000 P320 compact (M18) will join the troops.

A National Key Technology

France, Portugal, Denmark and other states have recently had to procure their small arms systems abroad due to a lack of domestic capacities. Other NATO states, on the other hand, such as Belgium (FN Herstal) and Italy (Beretta), can fall back on domestic production capacities.

In Poland, the Fabryka Broni Lucznik Radom arms factory is one of the suppliers to its own army. In 2017, it received an order to supply 54,000 new assault rifles named GROT ('SPEARHEAD'). This means that the weapon developed under the project name 'Modular Small Arms System' (Modulowy System Broni Strzeleckiej) is now finally joining the force. Among the first users, are the newly established territorial forces. The Polish Armed Forces also ordered a new service pistol in 9 x 19mm calibre from FB Radom. 20,000 new VIS 100 are to be procured, a relatively conventional hammer-fired pistol with a light metal frame.



Photo: Sinodefence/Twitter

Chinese People's Liberation Army with the new QBZ-191 in 5.8 x 42 mm

With the Ceska Zbrojovka (CZ) arms factory, the Czech Republic has a domestic player for firearm development and production. The current product range includes the CZ 805 Bren 1 assault rifle and the modernised Bren 2, both of which are now in the national arsenal and, in part, Slovak armed forces. CZ also offers two modern military pistol families - one hammer-fired and one striker-fired - as well as the EVO submachine gun (9mm x 19).

The factory also offered its modern firearms to NATO partner Hungary who, in March 2018, decided to modernise its small arms inventory with CZ products. However, Hungary attaches great importance to 'know-how' transfer and to having domestic production capabilities. Thus, the CZ Bren 2 assault rifle, the EVO submachine gun and the P-07 and P-09 cock-lock pistols are licence-produced in Hungary.

In Germany, under the aegis of dearly advised armament reformers, small arms

hevs Machine Factory). The new standard assault rifle AK-12 in 5.45mm x 39 is based on the AK-74M with regard to its operating elements. An almost identical AK-15, but adapted to the M43 cartridge (7.62mm x 39), is also intended to complement the Russian infantry toolbox. Although the AK-12 and AK-15 feature the classic gas piston system with

file (NGSW-R) and the light machine gun M249 Squad Automatic Weapon by a NSWG-Automatic Rifle (NGSW-AR). Both weapons are intended to fire ammunition still to be developed, but for which a new projectile is specified: the 6.8mm General Purpose Projectile. This ammunition, which is to be seen more in relation to the 7.62mm x 51 than the smaller 5.56mm

Photo: Jan-P. Weisswange



The G95K is a modified AR-15 type rifle with HK's reliable short stroke gas piston system.

Photo: DGA/Glock



The Glock 17 Gen 5 PANG

Photo: IWI



In 2019, IWI launched its modular CARMEL assault rifle system.

have not made it onto the shortlist of national key technologies. Nevertheless, products from the two traditional German firearms factories in Oberndorf and Suhl are in the final round of the project to replace the G36 with the new 'German Armed Forces Assault Rifle System'. Because of public procurement law, the official and industrial sides are remaining silent. Probable candidates are: C.G. Haenel with the MK556 and Heckler & Koch with the HK416 and HK433 models. A decision is expected at the end of the second quarter of 2020. Independently of this project, the G95k 'Special Forces Lightweight Assault Rifle' project ran smoothly. Here, a version of the HK416A7 was able to assert itself. Other German projects include a harmonised MG4/MG5 machine gun family as well as the pistol, cross sectional and the 'Special Forces Pistol System'.

The Russian armed forces decided in favour of two new assault rifles from the Kalashnikov Group (the former Izhmash = Izhevski Mashinostroitelni Sawod/Iz-

rotating bolt, the designers redesigned the receiver, barrel and the bolt system. Other details include telescopic shoulder stocks and picatinny type rails on top of the receiver and hand guard. Both assault rifles can continue to use AK-74 or AK-47 magazines.

The US Army Next Generation Squad Weapon Project

Technically speaking, the above-mentioned modernisations are only to a limited extent radical new developments. After all, relatively conventional systems are procured in established calibres. During the Cold War, Germany had already developed a completely new system with the G11 assault rifle project in 4.7 mm caseless. By the end of the Cold War, this technologically complex system was abandoned. The US Army is currently undertaking a new approach. With the project 'Next Generation Squad Weapon' (NGSW), they want at least partly to replace the M16/M4 family by a NSWG ri-

x 45, should not be confused with the 6.8 SPC projected earlier. Furthermore, according to the US Army, the NSWG weapons should also use AI algorithms for more effective deployment through modern sights and attachments.

On 29 August 2019, the US Army commissioned three companies to develop NSWG prototypes. General Dynamics OTS Inc., Textron Systems and SIG Sauer Inc. are each to develop two types of firearms and the corresponding ammunition. The project will last up to eight years, with weapons and ammunition expected to be delivered within 27 months of the award of the contract.

RM277 Weapon System

General Dynamics Ordnance and Tactical Systems is proposing its RM277 weapon system and has teamed up with ammunition manufacturer True Velocity, silencer specialist Delta P Design and weapons manufacturer Beretta Defence Technologies. Both the RM277-Rifle and



Photo: Jan-P. Weisswange

locity, while at the same time significantly reducing the weight of the weapon and ammunition by around 40%. A new silencer technology is also expected to help reduce muzzle signatures and improve overall control of the weapon.

SIG NGSW-R and NGSW-AR

SIG Sauer pursues a system house approach and offers weapons, ammunition and optics. In the NGSW project, the company proposes the SIG MG-6.8 as NGSW-AR and the SIG MCX-SPEAR as NGSW-R. Both weapons are designed for a new hybrid ammunition in 6.8 mm x 51 calibre.



Photo: Jan-P. Weisswange

CZ Bren 2 family

The MSBS can be configured as a classic or a bullpup system.

the RM277-Automatic Rifle are bullpup designs. They are magazine-loaded, gas and recoil operated, impulse averaged air-cooled guns. They operate according to the Short Recoil Impulse Averaging Technology, patented in 2012, already used in the General Dynamics Lightweight Medium Machine Gun chambered for .338 Norma Magnum. Thanks to this impulse averaging system with a short recoil, the guns should be able to hold their target well even when firing bursts and enable precise fire even at long range. The RM277 weapon system is developed around the True Velocity cartridge 277 TVCM. It carries the 6.8 General Purpose Projectile required by the US Army in line with the tender. The case is largely made of new and 100% recyclable composite material. The composite case is designed to insulate the cartridge chamber and bolt face from heat transfer, which reduces wear and tear on the weapon system. More efficient combustion of the compacted propellant powder should lead to lower standard deviations, higher bullet velocities, consistent precision and lower muzzle signatures. Furthermore, the ammunition does not contain any heavy metals that are harmful to public health. Moreover, the composite case and compacted propellant technology contribute to a weight reduction of 30% to 40% compared with conventional ammunition with a brass case. Thanks to 'significantly reduced production space', the ammunition could even be manufactured 'in-theatre' if required.

escoped ammunition with polymer cases since 2004, among other things as part of the 'Lightweight Small Arms Technology' (LSAT) project. The latter appeared to be gaining ground and has already been introduced in various calibres. A light machine gun with long-stroke gas piston system and moving cartridge chamber was also developed within this project. The Cased Telescoped (CT) technology is now also being incorporated into Textron's NGSW approach. Textron has teamed up with Heckler & Koch and Olin Winchester for the '6.8 CT NGSW' project. Heckler & Koch is contributing its expertise in weapons development and production. Olin Winchester produces the 6.8mm CT ammunition. In total, Textron Systems supplies 43 6.8CT NGSW-AR, 53 6.8 CT NGSW-R and 845,000 cartridges. According to Textron Systems, the 6.8 CT delivers significant performance gains, greater precision and a higher muzzle ve-



Photos: Textron

NGSW-R and NGSW-AR from Textron Systems.



Textron Systems

Textron Systems has been working on telescoped caseless ammunition and tel-

The SIG MG-6.8 is a lightweight machine gun with short-stroke gas piston system. It has a quick attachment interface for a belt box, while a magazine feed is not provided. At 5,440 grammes, the gun weighs 35% less than a comparable MK48 Mod 1. The weapon fires from the open bolt and features a recoil mitigation system. The feed-tray opens to the side. This allows optics easily to be used with in-line mounted night vision devices. The manual safety can be activated in any loading condition. The standard barrel comes in 16" length (406 mm). The

an effective range of 1,200 metres. Both the SIG MG 6.8 and SIG MCX SPEAR are multi-calibre capable systems, which can be chambered for other ammunition, such as 7.62 mmx 51 or 6.5 Creedmoor. Hybrid ammunition is also to be made available in other calibres.

New Machine Guns in New Calibres

With its NGSW designs, SIG Sauer contributes its experience with another new weapon, the SIG Sauer MG338. This has

(12.7mm x 99), while the SIG MG338 weighs only about a quarter as much and can be operated by one shooter. Similarly, according to the company, the new silencer not only reduces the muzzle signatures, but also the harmful effects of the muzzle gases on the shooter.

At the SHOT Show 2020, Dillon Aero presented the prototype of a Gatling system also in the .338 Norma Magnum. Interestingly, unlike the proven M134D, this one had only five instead of six barrels. The company also showed the weapon together with True Velocity, which presented an associated lighter .338 Norma ammunition with polymer case.



Photo: Sig Sauer

The SIG MG338 in .338 Norma Magnum



Photo: Jan-P. Weisswange

The Steiner Intelligent Combat Sight on Beretta ARX-160

functional and operational safety certification of the US Army is available.

The SIG MCX-SPEAR also works with a short-stroke gas piston system. It features a mechanism with a double charging lever. The weapon can be charged either in the classic AR-15 manner with the charging handle on the rear or with a smaller charging handle, which folds up on the left side of the receiver. The weapon is ambidextrous and has a 13" barrel. Silencers of the latest generation can be used.

The associated hybrid ammunition has the specified 6.8mm bullet and a combined steel and brass case. This allows weight savings of up to 20% compared with conventional ammunition. According to the company, the recoil of this ammunition fired from the SIG MG-6.8 is comparable to that of a 5.56mm x 45. However, the 6.8mm x 51 brings a significantly greater impact to the target at

already been procured by the US Special Operation Command. The SIG MG338 is a belt-fed, light mid-range machine gun in calibre .338 Norma Magnum (8.6 x 64mm). It is comparatively light at slightly less than 10 kg. The weapon works with a short-stroke gas piston system and has a specially developed recoil mitigation system, which is intended to make the felt recoil comparable to that of a weapon in 5.56 x 45mm. The weapon fires from the open bolt and has ambidextrous controls. The charging handle and feed tray can be swapped to the other side of the weapon. The manual safety can also be activated in any loading condition.

The SIG MG 338 complements the MGs currently in use in the infantry toolbox of the US army. Weighing less than a universal 7.62mm x 51 MG, it is more effective at significantly longer ranges. At up to 2,000 metres, it even comes close to the Browning M2 in calibre .50 BMG

Conclusion and Outlook

This overview of the major international firearms modernisation projects of recent years shows that progress is often achieved by adapting and modularising existing stocks. In the meantime, the philosophy of basic weapons and supplementary kits has become established. Even when switching to new systems, procurers usually stick to what is largely tried and tested. One reason for this is that new technological approaches have not yet been able to establish themselves sufficiently in series production. On the other hand, in recent years, the performance of the firearms systems has been enhanced through improved optics and optronics, improved ammunition and – observe closely – by a new awareness of the importance of thorough shooting and combat tactics training. Therefore, it follows from all this that a drastic system change could hardly be justified strategically, technologically and economically to this point.

It remains to be seen whether the US Army's NGSW project, in particular, will produce a new generation of firearms. Regardless of this, the next milestones will be in the field of optics and optronics - not only in terms of increased hit probability but also in terms of networking and AI-based target discrimination and prioritisation. Whether a technological 'game-changer' will come with the ammunition does not seem impossible. Of course, it remains to be seen which technological approach proves to be suitable for the field, because in war, as is well known, only the simple has success. Nevertheless, thorough research and development work in all areas of firearm systems will continue to make sense in the future, because the individual firepower of the soldier will also form a central effector in the digitised and networked battlefields of the hyperwar. ■

11TH INTERNATIONAL DEFENCE EXHIBITION AND SEMINAR



IDEAS 2020 PAKISTAN ARMS FOR PEACE 24 - 27 November 2020 Karachi Expo Centre



GLOBAL COOPERATION
STRATEGIC PARTNERSHIP

www.ideaspakistan.gov.pk



ORGANIZED BY

A VENTURE OF



MINISTRY OF
DEFENCE PRODUCTION

SUPPORTED BY



PAKISTAN
ARMED FORCES



DEFENCE EXPORT
PROMOTION ORGANIZATION

ENDORSED BY



TRADE DEVELOPMENT
AUTHORITY OF PAKISTAN

EVENT MANAGER



BADAR EXPO
SOLUTIONS

Official Publisher of Show Daily

Official Online Show Daily
and Official WEB TV.



IDEAS SECRETARIAT

C-175, Block-9, Gulshan-e-Iqbal Near Aziz Bhatti Park, Karachi - Pakistan
Tel: +92-21 34821159, +92-21 34821160 Fax: +92-21 34821179 Email: info@ideaspakistan.gov.pk



Pointing the Way in Europe's GOSSRA Project

Erik Wimmer

Rheinmetall has won the first request for proposals for preliminary studies relating to EU defence research financed by the EU's European Defence Union. Under a project 'Generic Open Soldier Systems Reference Architecture' (GOSSRA), the European Commission has appointed Rheinmetall to lead a consortium consisting of nine partners from seven EU member states.

Under GOSSRA, studies will be conducted into developing an open reference architecture as the basis of EU-wide standardised soldier systems. This includes electronics, voice and data communication, software solutions, man-machine interfaces, sensors and effectors.

A second stakeholder workshop was held in Brussels in mid-October, attended by participants from 13 EU member states, mainly defence ministries, procurement authorities and commercial manufacturers. At the meeting, the current state of the architecture was presented to stimulate discussion and solicit feedback. The meeting proved to be a success and consistently received positive feedback.

GOSSRA Facts

The aim of GOSSRA is to develop a Generic Open Soldier System Reference Architecture, which can be used as common reference architecture at the EU and NATO level for deriving the aforementioned target architectures at the national level. Designed to be ready for standardisation, this reference architecture for soldier systems is to be freely available, with no implications in relation to protected intellectual property. The reference architecture encompasses software, electronics, voice and data communication, sensors, effectors, human interface devices and C4I.

The architecture represents best practice as well as future trends and developments, while recommending standard interfaces. It is to be used as a reference to derive the

Photos: Rheinmetall



The GLADIUS soldier system

architecture for the specific soldier system to be procured. The reference architecture will be formulated according to the NATO Architectural Framework (NAF) v3, and build on work already performed in the European Defence Agency (EDA) studies STASS I and STASS II. It will be analysed and refined along with key comprehensive aspects and validated by tests and demonstrations.

Background

The Research Action Call on the topic 'Force protection and advanced soldier systems beyond current programme' with the subtopic "Generic Open Soldier Systems Architecture" was concluded under the Preparatory Action on Defence Research 2017. The contract for GOSSRA was signed on 27 April 2018 and received an EU grant of €1.5M over 22 months (1 July 2018 to 31 March 2020).

The GOSSRA consortium includes major European soldier system companies. Headed by Rheinmetall Electronics GmbH from Germany, the consortium includes nine participants from seven countries: GMV (Spain), iTi (Poland), Tekever-ASDS (Portugal), Larimart (Italy), Leonardo (Italy), SAAB (Sweden), Indra (Spain) and TNO (the Netherlands).

The project is motivated by technical challenges of soldier systems. With the increase in miniaturised, powerful electronics and computing capacity in the civilian sector and the need for networked systems and subsystems with comprehensive information exchange in the military sector, soldier systems are becoming increasingly complex.

Moreover, soldier systems can be used more efficiently when they exploit all relevant data. The data is not only generated by the soldiers themselves and the systems they carry, but will increasingly come from

Author

Erik Wimmer, Dipl.-Ing, MBA, is Project Coordinator for GOSSRA at Rheinmetall Electronics GmbH in Bremen, Germany.

'Small Tac-sources as well (higher echelon units, vehicles, other soldiers, unattended sensors, etc.). Exchange of data between soldier systems and these sources via a common communication network is, therefore, of paramount importance.

A trend towards growing diversity in the communication systems likely to be available to soldiers has been observed (military radio systems with different, specific and optimised capabilities in terms of range and throughout, communication devices based on commercial technologies, e.g. wifi, LTE, 5G, and optical communications might be possible as well).

Challenges

In many European nations, the architectures for the soldier systems to be procured are developed specifically by the national soldier system companies. The architectures of these systems are called 'target architectures' because they represent an architecture for a specific soldier system. At present, most EU member states have their own approach when it comes to soldier modernisation programmes. Many states are still in the prototype development phase or working on concepts for modern soldier systems. This results in country-specific systems that, with a few exceptions, are proprietary and lack interoperability in terms of electrical, electronic and IT aspects. However, operations in an EU or NATO coalition context or even with non-military partners, requires a high degree of interoperability.

Generic Architectures Offer Benefits

Over the years, open or generic architectures have come to be seen as key in making such complex systems more manageable and achievable. At the same time, reference architectures of this kind make soldier systems more affordable by:

- increasing operational effectiveness via complete networking of all systems;
- reducing the integration effort through standardisation;
- allowing innovation by upgrading subsystems, which can be easily integrated;
- enhancing competition for subsystems by making them interchangeable;
- reducing technical risks by using subsystems and integration approaches with high technology readiness levels,
- reducing logistic and maintenance efforts by reducing the variety of different subsystems; and
- increasing the number of suppliers as well as employing a common technical approach.

This kind of reference architecture encourages the use of specific approaches, guidelines, system structures and standards, making the individual target architecture to be procured easier to develop, while simultaneously ensuring the inclusion of all necessary aspects as well as the use of specific common standards that enable interoperability.

Current Status and Achievements

The intended GOSSRA standard is to be validated and applicable within a few years. A comprehensive trend and market analysis covering future global, operational and technological trends in the dismounted soldier system domain has already been conducted. The resulting 'Future Developments Document' was delivered to EDA on 31 January 2019.

The main result of the first project phase, the 'Extended GOSSRA Architecture', is a comprehensive architecture model, covering all important aspects and serves as a pre-stage for the intended GOSSRA architecture proposed for standardisation.

The current mature draft 2, version 2, was delivered on 28 June 2019. It conforms to NAF v3, which includes the following views: All View (NAV), Background View, Capability View (NCV), Operational View (NOV), Service Oriented View (NSOV), Security View, Technical View (NTV), and System View (NSV).

The different views focus on the following domains: 'Soldier Personal', 'Small Tactical Unit', 'Inter-Platform', 'Joint', and 'Combined or Coalition'.

As a starting point, architectures featuring in EDA OB studies on 'Standard Architecture for Soldier Systems I & II' (STASS I and II) were merged.

In the second project phase, GOSSRA underwent significant improvements and enhancements, with the focus on:

- Operational Issues: The Capability View (NCV), the NOV, and the NSOV were refined and harmonised.
- Maintenance and Logistics are not directly related to a particular NATO View. However, all views were refined and appended with the necessary aspects for supporting maintenance and logistics.
- Technical Issues: The NSV was completely revised in order to be more compliant with the NAF v3 and to ease the required architecture generated by an architecture tool.

Furthermore, a complete software architecture was added, which was almost entirely lacking in STASS I & II, and is of major importance for a soldier system ar-



The German armed forces are deploying the GLADIUS system under the name 'Infantryman of the Future'.

chitecture. Several standards have already been chosen for the proposed standard and have been recommended. This eases the task of the future work package on formulating the GOSSRA architecture for standardisation.

Stakeholder Engagement

GOSSRA appreciates contact with all relevant stakeholders, ensuring the success and acceptance of the proposed standard. For this purpose, a Communication and Dissemination Plan was prepared and delivered on 28 September 2018.

A Stakeholder Advisory Board (SHAB) was established with members of selected EU member states. A SHAB workshop was held at 2 October 2018 and a stakeholder workshop with a wider range of soldier system community members took place on 29 October 2019. The results of the workshops and feedback influenced the development of the GOSSRA architecture, meaning that the architecture now focuses on issues, which are important to the end-user.

The project is being carried out in close contact with the NATO LCG DSS, C41 & A working group (the body to which the standard will be proposed), where it gives regular briefings, and the EDA 'CapTech Land'. Other recent activities include participation in a special workshop on the Dutch soldier system VOSS. This was carried out by the NLD specifically for GOSSRA. Attendance at further key events is also planned, including a number of conference presentations at FEINDEF 2019. ■

No Place to Hide in the Dark

Tim Guest

Night vision (NV) technologies have come a long way since the first devices appeared in WWII, and where the dark was once a total asset, continued evolution of NV capabilities has meant tactics have also had to adapt now that the cover of darkness has slipped from night-time's shoulders.

Since the first NV devices (NVDs) were deployed during WWII, through to their more widespread use of them during the Vietnam War, NV technology has, to a large extent, overcome the natural limits

aids, and more. NV is a field that is continually evolving in generational increments. But where western nations previously held an advantage with the best NV tech, this position has largely been eroded over the

from that publication highlight how important darkness was in the past: "Darkness is helpful in achieving surprise, and the attacker will derive additional advantages from the defender's inability to aim his fire effectively." Furthermore, the booklet read: "During two world wars, night and other periods of poor visibility such as fog and snowstorms or rainstorms, gradually came to be considered the ideal time for action. Interference from the air reduced fighting and paralysed movements in daylight hours, with the result that the space between the front and the most remote corner of the rear areas was often empty and deserted. During the hours of darkness combat and movements resumed with new intensity." Then the text went on to say that "The purpose of movements in darkness or obscurity is to conceal preparations and thereby achieve maximum surprise and effect. Another important consideration is that night combat keeps the casualty rate at a minimum. Both elements apply to any operation from the time of assembly until its conclusion, whether it is a small unit action or a strategic envelopment. Movement and combat at night are inexpedient when a certain minimum amount of orientation is impossible because terrain conditions and the enemy situation are too uncertain, or when the moon or enemy action create conditions resembling daylight. Bright nights make it easier to conduct night operations, but they give the enemy more opportunity to observe and interfere."

Well, no matter how good NVDs have become, operating at night remains essential in both defensive and offensive ops, and whether darkness or low visibility due to smoke or weather pose a challenge, infantry and other arms must be able use their weapon sights, head/helmet-mounted NVGs and handheld or tripod-mounted devices, such as monocular scopes for prolonged surveillance to observe, acquire targets and engage an enemy with accurate fire. So, while the above extracts caution 'bright nights', moonlight and man-made illumination, and underline the fact that operations have always had to take into

Photo: Thales



Thales BONIE NVG also incorporates an integrated IR illuminator for use in zero light conditions.

of human visual sensory perception, with advances and inventions driven rapidly by such conflicts and urgent need. More recent conflicts in Europe and the Middle East have involved troops from many European nations who have found themselves deployed facing a wide variety of threats and enduring extremes of environment, geography and weather; deployed with them have been some of the latest advances in NV tech, from weapon sights, target acquisition devices to night driving

years, though advances are being made to regain a technological lead.

This article looks at the importance of NV with some historical and operational background, the technology behind NVDs, together with some new technological solutions.

Darkness – No Longer a Great Place to Hide

In the mid-1980s, the US Army's Center of Military History in Washington, DC published 'Night Combat', applicable across NATO, which looked back to the night operations of WWII with sentiments that, once tactically prudent in their entirety, have now been surpassed in many ways by NV technologies. A handful of extracts

Author

Tim Guest is a freelance journalist, UK Correspondent for ESD and former officer in the UK Royal Artillery.

tactical account being lit up at night, the only difference between then and now is knowing you are being lit up, or not. Today, the player with the best NV will have the advantage, though just because we now have NV devices to rely on, it does not mean soldiers can forget the basics of night operations' training. Protecting natural night vision is a key aspect that the NVD-user must be aware of. For example, adapting one's eyesight to the dark is crucial if eyes are to perform the best they can at night. Adapting to the dark, the eyes increase their sensitivity to low levels of ambient light, and their ability to see in the dark increases up to a maximum of some 10,000 times after about 30 minutes in darkness. However, as every soldier will know, that sensitivity can be wrecked in an instant by a bright light. Using NVDs/NVGs will also hinder the eyes' ability in the dark, although, if the eyes are allowed to reach their optimum night vision adaptation before NVGs are worn, then regaining full night vision after removing them will take little more than two minutes.

NV Tech

NVDs, NV goggles (NVGs) and/or night observation devices (NODs) are optoelectronic devices, capable of producing images in very low levels of light approaching total darkness. Some NVDs may work in tandem with an IR illuminator, making them active rather than passive devices, and typical/traditional images - conversions of both visible light and near-infrared (NIR) - have typically been monochrome, some latest systems offer a variety of colour palettes, which enhance target identification possibilities. From ambient light image intensifiers to advanced, IR thermo-sensors and new white



Photo: Thales

Handheld thermal imagers from Thales' SOPHIE family allow the detection of camouflaged targets.

phosphor, 3rd-generation thermal imagers, not only has the choice of NVDs expanded, but so, too, have the operational applications for them grown beyond simply employing such devices for night-time ops; their capabilities now extend into other scenarios, such as 'low-visibility' daytime ops, where dust, smoke and poor weather conditions that once reduced the ability of war fighters to see can now be 'penetrated' by new NV equipment.

For its part, an image intensifier magnifies the amount of received photons from various natural sources of ambient light, such as starlight or moonlight and is a vacuum-tube based device that can generate an image from a very small number of photons so that a dimly lit scene can be viewed in re-

al-time by the naked eye. When light strikes a charged photocathode plate, electrons are emitted through a vacuum tube that strike the microchannel plate that cause the image screen to illuminate with a picture in the same pattern as the light that strikes the photocathode, with the output visible light brighter than the incoming light.

In active illumination, image intensification is combined with an active source of illumination in the NIR or shortwave infrared (SWIR) band. Such technologies include low light cameras where active IR NV combines IR illumination in the spectral range between 700–1,000nm, which is just below the visible spectrum of the human eye, with cameras sensitive to this light. The resulting scene is dark to a human

VECTED
ENGINEERING. ADVANTAGE

CUSTOM-MADE THERMAL IMAGING TECHNOLOGIES

As an **OEM service provider** we offer complete in-house development of software and electronics for optoelectronic systems. Our **proprietary product lines** set standards in thermal imaging technology.

- Customer-specific product branding possible
- Tailored integration of the VECTED technology into the OEM product
- Exclusive use of European key components, ITAR free

VECTED GmbH: Engineering Advantage made in Germany.
www.vected.de • info@vected.de • +49 (0)911 960 687 0



Photo: Thermoteknix



The company Thermoteknix offers the CoVid video injection unit, which enables users to view HUD data covertly for combat operations in complete darkness.

observer, but appears as a monochrome image on a normal display device. With active IR NVDs incorporating illuminators that produce high levels of IR light, resulting images are typically higher resolution than are produced by other early generation NV tech. The drawback in today's military ops

is that active IR light can be detected by NVGs and latest NV technologies.

Another type of active illumination is that of laser range gated imaging, which uses a high-powered pulsed light source to illuminate a target, a technique which controls the laser pulses in conjunction with the shutter speed of the NVD camera's detectors. Single pulse or multiple pulse imaging can provide not only target detection possibilities, but also recognition.

Finally, thermal imaging is where even very small temperature differences/thermal radiation between background and foreground objects can be detected by the NVD; they do not require a source of illumination to produce images in darkness and in moderate weather conditions, such as light fog, rain, and, to an extent, smoke. Thermal imagers use an on-board thermal sensor to detect different amounts of heat energy to generate an image, with vivid colours or contrasting grayscale details representing a very specific, very large data set. Understanding what these colours and shades represent and learning how to best leverage them in the field allows the user to understand more precisely details about an identified target. Like any digital image, thermal images are made up of pixels, with the number of pixels in a thermal image determined by the optic's resolution. Higher-resolution sensors generate images with a higher pixel-count and generally produce clearer results. In thermal imaging, each individual pixel represents a specific temperature data point, each of which is assigned a unique colour or shade based on their value, so that as the thermal sensor detects changes in heat energy, it will express this change by adjusting the colour or shade of a pixel. These pre-set gradients, or thermal palettes, determine pixel appearance

and help identify different heat sources throughout a scene.

Most user applications focus on qualitative thermal imaging, which looks at the relative presence or absence of heat in a scene, rather than focusing on numeric temperature values. Reliable, qualitative thermal imaging hinges on recognising contrast between targets, objects of interest, and their environment. Detecting body heat or vehicle-engine heat, for example, will be priorities in certain scenarios, and establishing thermal palette preferences allows users to pinpoint heat sources reliably. That said, training troops in the use of such optics so they understand the equipment's imaging capability and what different kinds of targets look like in the field will be crucial to ensure their rapid understanding of what they are seeing under fire. Practice will ensure they can interpret and identify accurately what they see and act with the right response, and because users typically interpret thermal images differently, practice and personal experience will help soldiers under the stress of battle to resolve specific situations and images correctly. And current thermal imaging devices can offer to display the scene in a variety of different thermal palettes, whichever is chosen for a particular op, environment or personal preference. The most commonly used palette is 'White Hot' and displays warmer objects in white and cooler objects in black. Such grayscale palettes offer simplicity for scenes with a wide temperature span and generate images with realistic details. The versatility of White Hot makes it appealing for use in shifting landscapes and urban areas. A Sepia palette applies a warm, golden hue to the White Hot palette for reduced eye and mental fatigue and is ideal for instances of prolonged thermal surveillance where Sepia's narrow visual spectrum keeps users comfortable during long viewing periods. Other palettes range from Rainbow High Contrast suited to identifying targets with only slight temperature differences to the ambient, to Outdoor Alert, which is optimised for night-time, body-heat detection, as well as general-purpose palettes for quick ID of thermal anomalies.

Recent Developments

How NV systems have advanced is highlighted by some recent innovations by leading optronic players. Elbit Systems, for example, launched its SmartNVG last autumn, which is a C2 add-on to most existing NVGs and provides superimposed augmented reality navigation and operational symbology on any vision imaging system. This significantly improves the effectiveness of night operations and is compatible



Photo: VECTED GmbH

Vected's TC-320-25 TI device detects targets at ranges of up to 740 metres.



Photo: VECTED GmbH

The TC-320-35 thermal imager provides detection up to 1,030 metres. Also shown are the battery pack and interface to the weapon.

with common operating systems. Elbit is said to be the largest non-US military EO developer and is at the leading edge of NV technologies and applications including image intensification, uncooled and cooled thermal imaging for all bands. Elbit is the parent company of Instro, (part of Elbit's ISTAR Division), which has participated in various UK MoD vehicle programmes offering low-light, situational awareness camera vision systems.

In a similar timeframe to the arrival of Elbit's SmartNVG, and adding to its original, small clip-on thermal imager, ClipIR, which provides a fusion upgrade by injecting a thermal image into conventional NVDs, Thermoteknix brought to market its ClipIR XD. This has a 40-degree field of view, but with extended range performance and can take power from integrated helmet systems, reducing overall weight and improving helmet balance by not needing an internal battery. ClipIR XD also has an option for video input, allowing users to view video overlays, such as augmented reality symbology, directly through the NVD. The company has also brought out its CoVid Video Injection Unit, which enables the use of a head-up display (HUD) and to view HUD data covertly for combat operations in complete darkness. CoVid is powered by its host system and weighs less than 50 g when attached to a parent NVD.

With specific targeting for use by special forces, Thales recently introduced its BONIE High Performance (HP) NVG, for which the company collaborated with the French Special Operations Command in its development and together they consider it suited for dismounted, vehicle, marine and airborne freefall operations. The 640 g system provides end users with a wide aperture night vision binocular for effective use under extremely low light conditions. It has a 40° field-of-view with 1x magnification and includes second and third generation image intensifier tubes. It also incorporates an integrated IR illuminator for use in zero light conditions. The device also features an automatic cut-off capability when stowed on a combat helmet, which prevents inadvertent IR attracting the attention of enemy NV systems.

Qioptiq's recent advancements in NV have been in the areas of image intensification, uncooled thermal and fused surveillance, target acquisition and engagement equipment and include, among several systems, its Kite In-Line (KiL) is a compact Image Intensified Weapon Sight that is mounted on a weapon in front of a magnified day sight. The KiL has particular advantages compared to other similar equipment, in that it offers an excellent range performance-

to-weight ratio. The company's SAKER fused weapon sight for assault rifles and sharpshooter weapon platforms is another innovation, which combines image intensifier and thermal imaging technologies to deliver enhanced 24 hr capability to the user. Another clip-on solution is Qioptiq's DRAGON-S (Sniper) thermal weapon sight offering a 24-hour surveillance and target engagement capability for use with a range of optical day-scopes.

Another player at the forefront of NV developments is Photonis, which, actually, makes the intensifier tubes for the new Thales system, mentioned earlier. The company states that simply being equipped with optimised NV gear is not a guarantee for success in the wide variety of terrains that will be encountered by the

tech takes the spectral range into account. The colour spectrum of the night can widely vary; sometimes, during a moonless night, for example, it can be predominantly IR when there is night glow. The sky is otherwise predominantly blue. A wide spectral range that includes blue and UV sensitivity is therefore important, not just for better contrast of camouflage, but also to see in the many nights where blue dominates the night spectrum. The latest Photonis fourth-generation image intensifiers are said to be optimised for these modern-day multi-mission deployments.

Final Thoughts

The companies and recent product developments across the NV and optics sec-



Photo: Bundeswehr

The German Bundeswehr has introduced L3's FGE (Fusion Goggle, Enhanced) for special forces use.

modern combatant, and troops must be prepared for ops in many different theatres. In terms of NV systems, an important measure of performance is said to be the Figure of Merit (FOM) number for intensified NV equipment and the company has, in recent years, developed what it says to be a fourth-generation NV standard for such multi-mission deployments, one that not only offers the highest FOM, but also an extended spectral range, fastest and highest auto gating resolution and smallest halo. The halo effect is when a bright light source comes into the NVD's view, the entire night vision scene, or parts of it, becomes much brighter, and this can 'white out' other objects within the field of view. It's also important that latest NV

tor are too many to mention here and the above few have been selected for no specific reason. Image intensifier systems have been regarded as the standard NV tech for hand-held and helmet-mounted devices for years now, with thermal imaging devices becoming more readily available for both hand-held and weapon-mount applications more recently, particularly as size, weight and power reductions have improved. And real-time fused systems that combine more than one imaging technology – image intensification, thermal imaging, and day scopes – are now increasingly entering the picture and practical experience is highlighting the 24-hour tactical benefits provided by such systems. ■

Equipment in Riot Control

Tim Guest

Riot control employs a variety of equipment resources and approaches by police, military or other authorised security service personnel aimed at the control, dispersal or arrest of those involved in protests and rioting.

Security agencies employ a variety of both personal and unit-level equipment to prosecute their tasks effectively. The equipment and tools used may range from water cannon from companies such as Rosenbauer, temporary/mobile surveillance installations from vendors such as Viseum, riot-control agents such as gas irritants/lacrimators/tear gas, to incapacitate and disorient rioters making control and/or arrest easier. Water cannon often sees the use of dyed water so that protesters can be identified after the event. Helmets, batons, shields, body armour and non-lethal weapons such as rubber bullets and beanbag rounds, teargas launchers, which have been used in Hong Kong in recent weeks, also make up the inventory of riot control equipment typically used around the world. Beanbag rounds were first introduced in the US and while termed a 'less lethal/non-lethal' option, fatalities have occurred in their use; when employed properly and not fired at certain areas of the anatomy, such rounds are effective in non-lethally incapacitating protesters. However, few riots allow for level heads at all times by either side and serious injury is often inevitable using such equipment for protracted engagements with rioters. At a time when the riots in Hong Kong show little signs of abating, there now seems to be a new and curious non-lethal anti-riot weapon that may be set to enter the fray. A recent report in the South China Morning Post (SCMP) said that China has developed a world first in the form of a portable sonic gun for the control of rioters. The report said that the new device/gun uses focused/directed waves of low-frequency sound to produce extremely uncomfortable biological effects, including vibrations in the brain, ears, eyes, stomach, liver and other



A rapid deployment CCTV trailer in front of an HSBC bank branch



An advanced HD Pan Tilt Zoom (PTZ) camera

internal organs resulting in annoyance, dizziness, fatigue, severe headaches and potentially heart palpitations. The sonic wave is apparently generated by an inert gas heated inside the gun, which results in the gas particles vibrating in such a manner that they produce a deep, low-frequency sound. The SCMP reported that the sonic gun prototype had now passed field and third-party tests in mainland China to evaluate the body effects of the system; the weapon has been jointly developed by law enforcement agencies and the army. Whether the new sonic gun will be used on the streets of Hong Kong has yet to be seen.

Riot Control Surveillance

Apart for the personal equipment used by officers on the ground, authorities involved in riot control will be heavily in need of effective intelligence. They will need information about the make-up of the crowds they face, so that they can determine, for instance, if there are key

Author

Tim Guest is a freelance journalist, UK Correspondent for ESD and former officer in the UK Royal Artillery.

players who should be targeted by snatch squads for arrest, or the direction from which crowds are encroaching onto, perhaps, unsuspecting officers. Officers on the ground need eyes all around them. In such situations, CCTV cameras can be critical, although a riot-control CCTV camera that looks in just one direction, while useful, will not provide the complete situational awareness officers need. This is where 360-degree systems like the Rapid Deployment Intelligent Mobile CCTV tower surveillance system from Viseum is effective. The trailer-based system is easily moved from one location to the next and can be fully operational within minutes to provide temporary and semi-permanent surveillance, ideally suited to fast-moving and fluid riot situations. Each mobile security camera trailer produces more high-quality video evidence than a minimum of 200 installed, standard high-resolution fixed cameras and is said by the company to perform at least as well as six of any other advanced Pan Tilt Zoom (PTZ) camera installations, and that includes without the need for any surveillance monitoring and network infrastructure.

Viseum's Rapid Deployment Mobile CCTV delivers fast automated high-security situational awareness, automatically reporting incidents for rapid response as well as further investigation, with a single camera able to cover an area the size of four Olympic stadiums. The temporary deployment camera is self-powered for up to six months and will automatically detect, confirm and follow multiple targets or incidents within its 360-degree view, simultaneously providing high-quality imagery. The system has been used in riot-control scenarios in Malaysia where it was customised to meet the needs of the Kuala Lumpur Police; the Malaysian language was added to the Viseum CiVMS Video Management System, as well as a crowd-behaviour surveillance algorithm. The latter was customised to automatically send alerts and intelligence to the riot police tactical command and control as well as senior officers, thereby making it unnecessary to keep the CiVMS manned around the clock. In addition, the CiVMS video archiving system was customised to help the KL riot police to bookmark certain events, faces and people in the crowd during each operation. ■

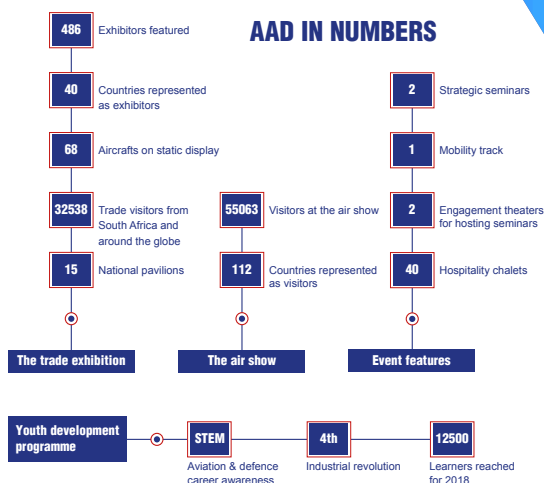


The trailer-based rapid deployment CCTV system is easily moved from one location to the next and can be fully operational within minutes.

BOOK NOW!



UNLOCKING AFRICA'S AEROSPACE AND DEFENCE POTENTIAL



#AAD2020 /// 16-20 SEPTEMBER 2020

AIR FORCE BASE WATERKLOOF, CITY OF TSHWANE, SOUTH AFRICA

WWW.AADEXPO.CO.ZA



/// BIGGEST AAD EVER - CELEBRATING 100 YEARS WITH THE SOUTH AFRICAN AIR FORCE ///

PARTNERS



SUPPORTED BY:



Detecting Explosives

Science, Technological Innovation and Solutions

Tim Guest

Across the globe, increasing threats of terrorist attack against national targets, infrastructure and population, have security agencies on high alert. Incidents of explosive smuggling, including losses of radiological materials, are reported to be on the rise. Post-conflict unexploded ordnance contamination also remains a serious problem, globally. These factors, in turn, are driving urgency within defence industry and scientific circles, to research, innovate and develop powerful tools, techniques and technologies able to detect explosives of all kinds in a wide range of scenarios.

Explosive detection, commonly used in border control scenarios and at airports and maritime ports, is the catch-all term for various non-destructive methods of inspection using a range of equipment, techniques, and procedures to determine the presence of explosives or explosive residue in, or on, a container, surface, clothing, or other suspect item. Explosive detection is also used in military contexts; in the previous issue of ESD, for example, we looked at some of the unmanned de-mining systems currently in development, or employed, to help rid the world of hidden landmines through typically 'destructive' techniques. However, it is the initial detection of such ordnance, using various ingenious means and scientific methodologies that's relevant here. This article, therefore, not only touches on some science incorporated into detection products and methods, but also the market for explosive detection equipment, industry players and some of their solutions on offer; it also looks at certain de-mining innovations, including a fascinating, NATO-sponsored research project that has the de-mining community 'buzzing'.

Detection Methods and Science

For the major groups of explosives – the nitroaromatic explosives, nitrate ester, and nitramine explosives, as well as explosives based on inorganic nitrates – the use of colourimetric testing is a well-established and

widely-used method to detect explosives. This relies on colour-changing, fluorescent sensors that can detect and identify multiple explosive types within 10 seconds or less, differentiating between such explosive compounds as: TNT, Tetryl, PA, TNT, DDNP, DMNB, HMX, RDX, and PETN.

This kind of testing involves applying a chemical reagent to a suspect item and observing for known, common colour reactions that indicate if an explosive material, and typically what type, is present. However, this approach relies on the presence of nitrogen to achieve positive results, whereas in cases where explosives do not contain nitrogen and are, for example, chlorate or peroxide based, such as TATP (Acetone Peroxide), colourimetric detection is not as effective, if at all.

Spectrometry of various kinds, e.g. Ion mobility spectrometry (IMS), similar to mass spectrometry (MS), is also widely used to identify target molecules in a range of lab, back-room, and operational applications forming the basis of several product solutions deployed in places like airports. Gas chromatography (GC) is sometimes used to separate molecules prior to MS, and can offer another layer of information about a particular molecule aiding in its identification. Explosives can also be detected using computed axial tomography (CT) x-ray scanning, which can determine the density of a material, unless obscured within some form of casing or other electronic equipment, and match it to a threat library; such CT systems are used in scanning machines at events, airports, and other locations. Whilst other complex scientific methodologies can be employed to detect for explosives, space prohibits any worthwhile discussion of these in this article. With a similar reference to space, the use of taggants to



Photo: CSES

GroundHunter Advanced Wire Detector (AWD) serves for the detection of wires associated with IEDs, including command wires.

Author

Tim Guest is a freelance journalist, UK Correspondent for ESD and former officer in the UK Royal Artillery.



Photos: Smiths Detection



Smiths Detection's HI-SCAN 10080 XCT is a dual-energy scanner that can handle 1,800 bags per hour. The system is currently being trialled at Sydney Airport in Australia.

The CT-based HI-SCAN 6040 CTiX used to screen carry-on bags has been trialled successfully at Sydney Airport.

mark explosives at manufacturing stage is worth a brief mention; taggants are used to make detection and identification by animals and equipment easier, and to enable agencies to trace an explosive back to the maker and, potentially, to the buyer. That said, the evolution of explosive taggants is very involved; some taggants tried have had adverse effects on an explosive's performance in legitimate operational scenarios, while others have not withstood the forces of detonation well enough to be worthwhile. One latest method of explosive marking is the Nuclear Barcode, which tags explosives by adding low concentrations of eight different elements to the explosive, and then reads the tag from the post-blast residue using neutron activation analysis to identify the elements and their concentrations.

The Market for Explosive Detection Solutions

The global explosive detection equipment market has been monitored and analysed by the Technavio research group since 2017 and its recently released report "Global Explosive Detection Equipment Market 2019-2023" suggests that the sector is poised to grow by some US\$3.1Bn during this 4-year period. This growth, apparently, is driven by "the enhanced security mandate of authorities", which, in the face of recent terrorist attacks in Europe, Asia, and worldwide, is unsurprising. In addition, the anticipated advent of wearable explosive detection equipment will, according to the research, further boost growth in the sector.

With the illicit movement of explosive materials, security agencies globally are not only being encouraged to enhance their security planning, but are also facing man-

dates to deploy preventative measures such as anti-explosive detectors and scanners across a range of critical infrastructure sectors, including, but not exclusively: aviation, offshore oil and gas, transportation, the air cargo supply chain, and maritime sectors. But with an even wider range of global applications, from border security, public safety, and defence, to airports, transportation and logistics security, all demanding reliable explosive and explosive trace detection, the development of devices, such as hand-held detectors, ground-mounted, and vehicle-mounted screeners is increasing.

Let's take a look at some of these from some a handful of leading explosive detection specialists.

Makers of Explosives Detection Equipment

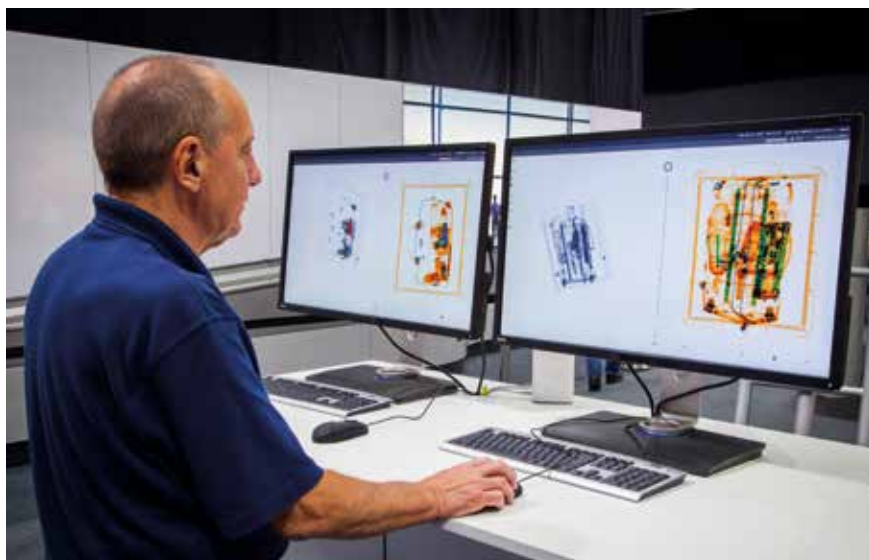
While a great many companies are involved in the explosive detection sector, contributing to the industry's projected figures, only a handful can be mentioned here. As with most in the sector, they employ some of the science mentioned above in their products, as well as other methods and technologies. Falling into the latter category with its battle-proven Husky Mounted Detection System (HMDS) is Chemring Sensors and Electronic Systems' (CSES). HMDS, a product of CSES subsidiary, NIITEK, now integrates a Wire Detection (WD) Array with the HMDS' Ground Penetrating Radar (GPR) with the combined effect that it can now, not only detect sub-surface IEDs, but also the command wires and wiring systems used to remotely detonate or trigger them. CSES' GPR was specifically designed for detecting metallic and non-metallic mines, and its handheld system, Groundshark, uses GPR

together with electromagnetic induction (EMI) to detect, locate, and visualise buried hazards and anomalies, with precise target centering providing real-time audio and video feedback. The product meets MIL-STD-810F/G requirements for ruggedised military equipment. GPR is also at the core of the company's R-VISOR GPR (robotic VISOR) robot-mounted mine and IED detection system, combined with a sophisticated metal detector, giving the user the ability to mark and visualize buried IEDs, antipersonnel, and anti-tank landmines.

Another player in this sector and using GPR for IED detection is Cobham Antenna Systems, which markets both hand-held and vehicle-based modular and scalable systems that can be integrated onto a range of tactical robots and vehicle platforms. One of its solutions is the Vallon MINEHOUND VMR3 hand-held detector, a joint-development with Vallon GmbH in Germany. It combines Cobham's 1GHz GPR with a Vallon metal detector (MD), a dual-sensor approach that provides advanced high-performance detection of metallic, minimum-metal and non-metallic threats, including mines and IEDs.

The system's MD and GPR can operate simultaneously, or individually; when a threat is located, the MD audio provides accurate position information as well as an accurate indication of how big an object is. The GPR audio provides additional position and depth information and identifies the radar cross-section of the target. The system can differentiate between targets and false clutter caused by such things as bullet casings, shrapnel, and other non-explosive metallic objects. The MD function, however, is the prime search capability and offers a highly sensitive technology to locate even minimum-metal mines (such as the PMA3

Photo: L3Harris



All L3 Harris scanners link into the company's OptiNet networking infrastructure, which connects them to viewing stations and search workstations typically seen as we all pass through airport security.

Photo: L3Harris



The ultra-high-speed, dual-energy MV3D can scan at a rate of 1,800 bags per hour and uses a series of fixed X-ray sources and multiple detector arrays to create high resolution 2D and 3D images of target objects.

and M14), with MD sensitivity set by the operator. The GPR is self-calibrating when in use and indicates it is operating correctly with an audio signal every 7.5 seconds. A dedicated state-of-the-art DSP processor provides all control and signal processing functions.

Another provider of handheld explosives detection equipment, as well as desktop solutions, is FLIR Systems. The company's Fido X-Series (X2, X3, X4) of handheld explosives trace detectors (ETDs) combine sensitivity, speed, and ease of use for security teams in a variety of field scenarios, including preventative screening operations where fast, accurate results are needed. These solutions all rely on FLIR's proprietary TrueTrace technology, which detects a broad range of threats at nanogramme to sub-nanogramme levels, including military, conventional, homemade, as well as liquid explosives using multiplexed luminescence technology; each TrueTrace sensing mate-

rial is formulated to react to a specific class of explosives. The slightest change in luminosity is measured to determine the presence of invisible explosives residue and the speed with which the TrueTrace technology enables the Fido-X solutions to deliver results make them suited to mass transit, sporting arena and critical infrastructure checkpoint applications. Front-line operators using the systems collect surface residue from the surface of vehicles, laptops, bags, cell phones, belts, crates, boxes, letters, or other items using a sampling swipe, which is then inserted into whichever ETD is in use. Any particles are heated, vapourised, and are drawn into the detector to be swept across the TrueTrace detection materials; any change in response on each detection channel is measured and analysed by the detector to deliver either an all-clear response or threat alarm. TrueTrace can detect a number of emerging explosive formulations and has a quick, three-minute

start-up time and a fast ten-second analysis phase. The company's Fido X4 was actually launched at the end of last year, incorporating a new five-channel TrueTrace sensor array that delivers expanded threat coverage. The company is currently working on a hardware integration kit that will sync Fido X4 with the company's Packbot unmanned ground vehicle, widely used for explosive ordnance and bomb disposal, later in 2020.

Complementing FLIR's handheld portfolio are solutions like the company's 'GC-MS' gas chromatography/mass spectrometry-based Griffin G510 portable solution, which adds further accuracy at the scene of a detection event; GC-MS technology can quickly confirm the identity of an explosive to deliver additional forensic-level intelligence.

Also supplying handheld detectors is L3Harris, which has its H150E handheld explosives and narcotics trace detector in use with several end users. This handheld detector can rapidly detect and identify trace amounts of a wide variety of explosives and narcotics using a 'real-time' detection algorithm for fast results, alerting the operator as soon as it detects a threat. Like systems mentioned earlier, it has a rapid clear-down cycle and other features that minimise system contamination, ensuring the detector is ready for the next sample within seconds, even after a positive detection. A positive threat result is indicated by both visible and/or audible alarms, with the substance identification clearly displayed. Spectrograms, administrative functions, and diagnostics can be accessed and viewed on the integrated 4.3-inch colour touchscreen.

Detecting Explosives at Airports

No article on explosives detection would be complete if it did not, at some point, refer to the detection systems we all encounter on a daily basis traveling through airports or entering large convention centres and the like. Two players – amongst many – active here are L3Harris and Smiths Detection.

Meeting what it says are current and emerging regulatory requirements, the checked baggage security screening solutions in the L3Harris explosives detections portfolio are many. Differentiated by the speed with which they can perform their scanning functions, (which translates to numbers of bags that can be analysed per hour), systems include the widely deployed eXaminer 3DX, the enhanced speed eXaminer 3DX-ES, the high-speed eXaminer XLB and the ultra-high-speed, dual-energy MV3D. All these scanners link into L3Harris'



28-30 April 2020

ExCeL, London, UK

REGISTER AT
WWW.ITEC.CO.UK



JOIN US AT THE INTERNATIONAL TRAINING TECHNOLOGY EXHIBITION & CONFERENCE



2,000

industry specific
attendees



45+

nations
represented



4

conference
streams



75+

exhibiting
companies



130

international
VIPs

For sponsorship and exhibition enquires contact James Condley, Event Manager



James.Condley@clarionevents.com



+44 (0)20 7384 7788

Organised by

NTSA

Organised by



Organisers of

DSEI

DisTec sponsor

IMPROBABLE

Technology partner

RiVR



GroundHunter Multi-Head Detection System (MHDS) is the world's first IED detector to have interchangeable command wire and metal detection heads. This allows search teams to respond rapidly to changing search requirements.

OptiNet networking infrastructure, which connects them to viewing stations and search workstations typically seen as we all pass through airport security.

Taking the XLB as an example, the system can scan 1,200 bags per hour (bph) and like the other scanners mentioned, uses dual-energy CT technology / 3-D Continuous Flow CT; operators will view high-resolution, 3-D images of alarmed bags in their entirety, or individual threat objects from any angle to help resolve alarms quickly.

The MV3D can scan even faster at 1,800 bph and uses a series of fixed X-ray sources and multiple detector arrays to create high resolution 2D and 3D images of target objects. This design provides the end user with the operational benefits of a traditional automated checked baggage screening system and the detection performance previously available only from rotational-gantry CT systems.

Smiths Detection's HI-SCAN 10080 XCT is another dual-energy scanner that can handle 1,800 bph; it has performance capabilities based on Smiths Detection's dual-energy x-ray line scanner with a proprietary single energy volumetric CT scanner providing full 3D, high-resolution imaging and reconstruction. The system is currently being trialled at Sydney Airport in Australia to screen carry-on and hold baggage. This follows successful explosives detection trials that ended late last year of another of Smiths' solutions at the airport, the CT-based HI-SCAN 6040 CTiX used to screen carry-on bags.

Detecting Explosives with Animals

Perhaps the most widely recognised animals used to detect explosives are dogs. With noses that possess up to 300 million olfactory receptors, compared to about six million in humans, dogs can, when alert and not tired, be extremely sensitive to different target materials. Once a sniffer dog becomes fatigued, boredom can set in and its effectiveness in detecting explosives diminishes. That said, in addition to having a huge number of olfactory receptors, the

part of a dog's brain devoted to analysing smells is, proportionally speaking, some 40 times greater than the corresponding area in a human brain. Working with specially trained handlers, sniffer dogs will generally give a trained, passive response when they recognize an explosive scent, understood by the handler, but not bystanders.

In mid-2018, such sniffer dogs, capable of detecting minute traces of explosives concealed in air freight, were deployed in cargo sheds at British airports to reinforce the UK's aviation security. Designated free running explosive detection dogs (FREDDs), though working in close partnership with their human handlers, the dogs are used to check large volumes of air cargo for a range of explosive materials, complementing existing screening methods. Each animal undergoes 12 months of rigorous training to achieve government certification before being deployed, though are subject to a regular quality assurance programme throughout their operational lifetime to ensure the animals' detection capabilities are maintained.



The HMDS (Husky-Mounted Detection System) Wire Detector system consists of up to six PODS sensors integrated into a single assembly routed into a Vehicle Interface Box feeding into the GPR. The sensor array is located forward of the vehicle front bumper to provide detection prior to overpass.

While man's best friend may have held the 'lead' position (excuse the four-legged pun) in the explosives sniffer-animal league tables for many years, it may soon be time to 'roll over' (sorry again) – in some scenarios, though not all – and make room for a six-legged, four-winged interloper.

For at least the last 20 years now, the ability of honeybees to 'sniff' out explosives has been known, and their potential to be trained to detect explosive materials has been the subject of research and study by a select number of leading scientists and institutes, including the world-renowned Rothamstead Research.

Results, however, have so far not been commercialised or deployed operationally, although that situation may be about to change in the not-too-distant future.

NATO Support for Bee Detectors

A NATO-financed project under the 'NATO Science for Peace and Security Programme' initiative has reached a point where it projects that explosive-detecting honeybees, trained to sniff out the trace explosives detectable in disused minefields across the globe, will be ready for operational deployment in the next five to 10 years.

The 'Bees4Exp' project [Biological Method, Bees, for Explosive Detection] began in November 2017 and its current 3-year schedule is due to conclude in November 2020; the project is developing innovative methods and technologies to detect legacy landmines using trained bee colonies, employing three different techniques: training honeybees for explosive detection, using polymer films as explosive sensors, and im-

aging honeybees as they fly over and congregate in the region of unseen landmines. Project partners are the Croatian Mine Action Centre and its Centre for Testing, Development and Training, the University of Banja Luka's Faculty of Electrical Engineering, the University of Zagreb's Faculty of Transport and Traffic Sciences and the University of St Andrews' Organic Semiconductor Centre.

With mines still present across Croatia, Bosnia and Herzegovina, as well as many countries through the world, the region's academic institutes have been investigating de-mining for years; with their understanding of how expensive, time consuming and dangerous most current de-mining procedures are they want to come up with innovative solutions using biological methods of explosive detection to use alongside other proven, well-developed techniques. And what they now recommend is using trained bee colonies as efficient, standalone detection tools.

Two main methods, passive and active, are used with the trained honeybee colonies. Passive – this part of the NATO project is where the bees are allowed to fly freely around a suspect area, pollinating as they go. In the process they also pick up trace particles of explosives from leaking mines;



Photo: Bees4Exp

Bees4Exp Project hives on the edge of the simulated minefield where some 1,000 former Russian or Yugoslavian mines and ordnance litter the 10,000 square metre minefield.

TNT after time degrades to DNT, which releases the volatile molecules the bees pick up from grasses and meadow plants and flowers. When they return to their hives, the researchers have created 'tunnels' through which the bees must walk to reach the colony inside. The walls of the tunnels are coated with luminescent organic semiconductor films/ Super yellow film and pick up the explosive particles, which can be analysed. The bees fly around the same

area for ideally three days (one is too short and five too long) and once analysis of the tunnel samples is complete it can be seen clearly whether or not the area is contaminated by mines/IEDs.

Active – this part of the NATO project is being undertaken in Zagreb and involves the use of drones (not the male honeybee variety, of course!) to follow bees from the hives – bees which have been trained to associate the scent of explosives

XII International Aviation and Space Salon **AVIASVIT-XXI**



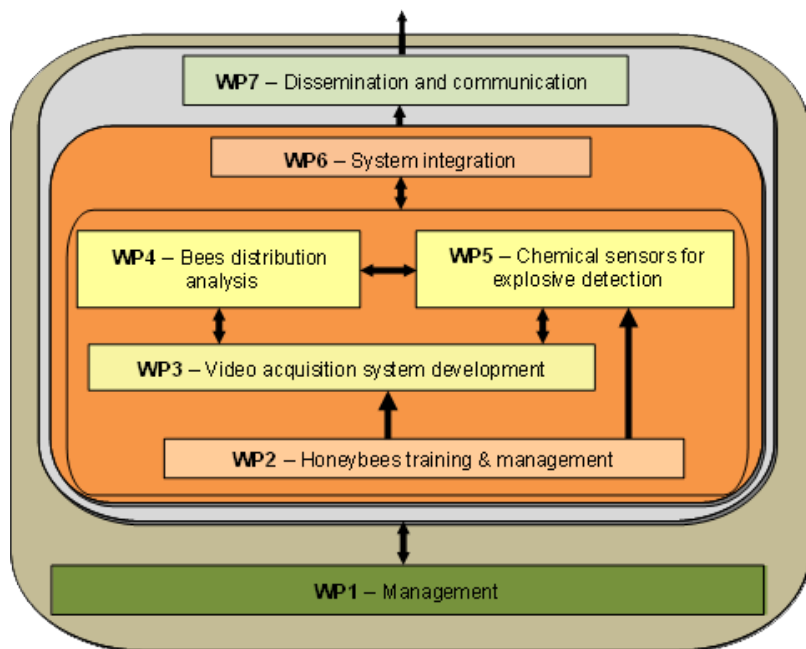
October 13 – 16, 2020
Ukraine, Kyiv

General Information Partner:



INTERNATIONAL EXHIBITION CENTRE
Ukraine, Kyiv, Brovarskyi Ave, 15
Livoberezhna underground station

+38 (044) 201-11-63
tor5@iec-expo.com.ua
www.iec-expo.com.ua



Interdependencies between the work packages (WPs)

with sugar water, which results in them swarming, quite accurately, over and around a location on the ground where they think there is a source of nectar, when, in fact, they are actually hovering over unexploded ordnance/mines. Flying above the area, and equipped with high-definition and thermal cameras, three drones monitor the honeybee movements and produce a detailed overlay of targets on the ground.

The project is organized into seven work packages (WP) shared between the four partners: WP 1 Management; WP2 Honeybees training and management; WP3 Video acquisition system development; WP4 Bees distribution analysis; WP5 Chemical sensors for explosive detection; WP6 System integration; WP7 Dissemination and communication.

The NATO-funded Bees4Exp project hopes to integrate each key aspect of the project – detection, sensors, imaging – into a flexible, sensitive, and robust technological

solution that can be effectively employed in the field. The project team views these new ‘tools’, tested in Croatia, Bosnia and Herzegovina, as low-cost technologies appropriate for use in many countries around the world. [The team consists of Professors Zdenka Babić and Nikola Kezić from the Faculty of Agriculture in Zagreb University, who pretty much started it all, along with drone expert, Mario Mustra, also from Zagreb. Bee expert, Janja Filipi, is from Zadar University and Zdenka Babic and Mitar Simic are from Banja Luka's Faculty of Electronic Engineering. Scottish team members include Ross Gillanders and Graham Turnbull from St Andrews.]

ESD got in touch with Dr Ross Gillanders, Senior Research Fellow at the University of St Andrews' School of Physics & Astronomy, who heads the university's contribution to the project along with colleague Graham Turnbull. He said that by November this year it is hoped that the ‘techniques developed will be

ready to start a validation process to move them towards commercialisation using blind tests’, with results thus far ‘looking very good’. At the same time, however, the team is trying to identify new funding sources for this follow-on work; Gillanders said that participants from industry are yet to get involved in this exciting work, though the team is confident interest will grow, and actively participates at events such as the Mine Action conference where exposure to industry participants presents mutual opportunities.

Of the test site at Benkovac, Gillanders said that some 1,000 mines and explosive ordnance – a mix of mainly Russian and Yugoslavian devices – are present over the 10,000-square-metre, simulated-minefield site. He said that the amount of explosive material returned to a hive by bees is something the team is trying to calculate as it can be an indication of the density of mines in a given area. He also indicated that they see honey bees as a complement to other explosive detection methods: “The aim is to give the de-miner another tool in the toolbox. For instance, bees are not an all-year-round solution, nor are they suited to all topographical scenarios; a seasonal April-September operational timeframe in areas with vegetation seems likely as their optimum performance period. And they also don't like high winds.”

In terms of how the methodology would be commercialized, whether by creating ‘specialist trained bee colonies’ and how they would be used, Gillanders told ESD that, “I think training them, then leaving the colony in a community [where there is a local landmine problem], is likely, although everything else -- optical sensing, drones, signal processing -- would be delivered more as a service.” ■

European Security & Defence Now available in e-paper format!

MITTLER REPORT

Enjoy reading European Security & Defence as e-paper for your tablet computer or smartphone.



App available in Axel Springer AG's iKiosk

Single copy: 2.99 Euro
Subscription (8 issues/year) 10.99 Euro

1. Install iKiosk app on your tablet device (available as freeware in Apple App Store and Google Play Store)
2. Select European Security & Defence in iKiosk and order!

European Security & Defence

ORDER

MITTLER REPORT VERLAG GMBH · Baunscheidtstraße 11 · 53113 Bonn, Germany
Fax: +49 (0) 228 35 00 871 · info@mittler-report.de · www.mittler-report-shop.de

Renaissance of the Mortar

Christopher F. Foss

After many years of neglect, an increasing number of users are now placing growing emphasis on their mortar systems, as for most infantry battalions these are the only indirect fire weapons under their direct control and can therefore rapidly respond to calls for fire support.

Recent mortar developments include 120mm turret-mounted mortars which can be integrated onto tracked and wheeled armoured platforms, and can be used for both the direct and indirect fire missions.

A good example is the Finnish Patria NEMO 120 mm turret-mounted mortar system which is already in service with the Kingdom of Saudi Arabia installed on a batch of General Dynamics Land Systems Canada Light Armoured Vehicle (8x8).

Further development by Patria has resulted in an integrated containerised NEMO 120mm which can be installed on an 8x8 cross-country truck chassis with another version on a naval craft already in service with the United Arab Emirates.

There is also a new generator of mortars that can be installed on light cross-country vehicles.

A typical example is the Spanish NTGS ALAKRAN Light Mortar Carrier (LMC) which is already in service in the Middle East integrated on a Toyota LAND CRUISER 4x4 platform, with the Ukraine also deploying the system integrated into a BARS 8 4x4 armoured personnel carrier. To reduce the recoil force when firing, the 120mm mortar and its associated baseplate is lowered to the ground over the rear of the platform. If required, the 120mm mortar barrel can be replaced by an 81mm mortar barrel and it is normally coupled to a computerised fire control system (FCS) to enable the system to come into action, carry out a fire mission and then redeploy to another position be-



Photo: Christopher F. Foss

A Toyota LAND CRUISER 4x4 with the Spanish ALAKRAN 81mm mortar system lowered to the ground over the rear

fore being located by threat target acquisition systems.

In addition to the actual mortar, there have been significant improvements in the key areas of ammunition with many users now requiring mortar bombs to be insensitive munition (IM) compliant.

Mortars are traditionally an area effect weapon and in addition to firing high-explosive (HE) mortar bombs, also fire smoke and illuminating munitions. For 120mm mortars, rocket-assisted mortar bombs have been developed, and the requirement for increased accuracy and less collateral damage has led to the development and fielding of precision guided munitions (PGM) for use against high value targets.

In order to carry out a successful mortar engagement, the target has to be detected which can be via a mortar fire control team equipped with lightweight day/night observation devices, laser rangefinder, land navigation systems, and a communications link direct to the mortars, which are normally deployed in units of three or six, or to a higher chain of command.

The mortar is just one indirect fire weapon, with the others being conventional tube artillery systems and rocket launchers but with the increased emphasis on joint firing. There are today other weapons that can be used to neutralise a given target including fast jets, attack helicopters, unmanned aerial vehicles and, in some cases, naval gunfire support.

A higher level would have a wider range of target acquisition capabilities at their disposal than a mortar fire control team, including locating radars, sound ranging devices, radars, UAV's, and electronic warfare, to name but a few.

An increasing number of countries now have Joint Terminal Attack Controllers (JTAC) can call in not only close air support assets, but other indirect fire assets to enable targets to be more rapidly engaged.

In the past, mortars have always been controlled by the infantry, but some countries now place all mortars under the direct control of the artillery as they have a wider range of target acquisition capabilities. ■

Author

Christopher F. Foss has been writing on armoured fighting vehicles and artillery systems since 1970 and until recently was editor of Jane's "Armoured Fighting Vehicles" and the artillery element of "Jane's Artillery and Air Defence". He has also lectured on these subjects in many countries as well as chairing conferences all over the world. He has also driven over 50 tracked and wheeled AFVs.

Inner Layer Defence Systems

New Developments Against Anti-Ship Cruise Missiles and Asymmetric Threats

Luca Peruzzi

In recent decades, navies worldwide and the global defence industry have started to tackle the new airborne, missile and surface threats. The latter has influenced the development of multi-layered defence concepts for naval forces.

The emergence of new supersonic, high-diving and highly manoeuvrable anti-ship cruise missiles (ASCMs) and new asymmetric threats has accelerated the development of new inner layer defence systems (ILDS), in which defenders are networked and extend their range, and where research is undertaken into innovative weapons, such as lasers.

Photo: Raytheon/US Navy



The Raytheon Mk15 CIWS in the PHALANX version with the six-barrel 20mm Gatling gun M61A1 is the subject of a development programme to replace the current pneumatic gun drive systems with an electric gun drive system.

Guns

With over 1,000 systems in service with US and 25 customers – and more in production for the US Navy, US Coast Guard and other navies – the Raytheon Mk 15 is the most diffuse self-contained all-weather, day-and-night, fully-automatic from search to engagement Close-In Weapon System (CIWS) with its own radar/electro-optic suite. The system is available in both the PHALANX variant with the 20mm M61A1 six-barrel Gatling gun capable of 4,500 rounds/min fire-rate with armour-piercing rounds and a 1,550 rounds magazine, and the Mod 31/32 SeaRAM variant with an 11-round launcher for the Raytheon Rolling Airframe Missile (RAM) RIM-116B/C Block 1A/2 for extended ASCM coverage. The Raytheon CIWS entered service in 1980. In recent years, Raytheon introduced the Block 1B surface mode configuration, which incorporates a stabilised thermal imager and an automatic video tracker to counter asymmetric threats, including small, fast, surface, and slow air threats such as UAVs as well as ASCMs engagement. The Mk 15 was also subjected to radar upgrades (Block 1B Baseline 2) that introduced a 'state-of-the-art' digital system to improve performance against advanced ASCMs and to increase reliability. To keep the systems in service until 2040, according to US Navy FY2021 budget request documentation, in FY2018 a limited Technology Refresh development started for the Electric Gun Drive System (EGDS),

with completion in FY 2019/2020. To be integrated during overhauls, the EGDS will replace the current pneumatic gun-driven system and it will reduce maintenance and support costs and allow also for variable firing rates (currently not available) with reduced ammunition expenditures.

Lasers

Moreover, the US Navy is working on the High Energy Laser Counter ASCM project (HELAP) to assess, develop, and demonstrate the various laser weapon technologies needed to defeat ASCMs in a crossing engagement. The knowledge gained in the Navy Laser Family of System efforts, including the Ruggedised High Energy Laser activities, the Solid-State Laser Technology Maturation, the Surface Navy Laser Weapon System Increment 1 or High Energy Laser and Integrated Optical-dazzler

with Surveillance (HELIOS) and the Optical Dazzling Interdictor Navy programmes, together with the new HELCAP technical solutions to the ASCM threats, will enable an informed decision to field an integrated, fleet-ready HEL weapon. The FY2021 budget will provide for systems engineering, mission analysis, and the design completion, fabrication and integration of major components of a HELCAP prototype for an experimentation and demonstration phase between FY2022-2023.

In March 2018, Thales Nederland announced the successful sea acceptance trials of the first upgraded system under the GOALKEEPER Upkeep (CIWS) programme. The upgrade includes a new colour TV and IR electro-optical set, latest generation control station, operational software and processing power. These improvements provide added accuracy, reduced reaction time, and enhanced multi-target engage-

ment capabilities against the latest ASCM and asymmetric seaborne threats. The upgrades will be ready on-board by 2022. The Netherlands MoD is expected to unveil a replacement programme in 2020. In the meantime, Thales Nederland and LIG Nex1 signed a contract for the overhaul of the first two GOALKEEPER systems on board South Korean Navy's KDX-I ships. The overhaul will be carried out in cooperation with the Dutch MoD and LIG Nex1. The latter announced in April 2019 the opening of a new GOALKEEPER maintenance facility at the company's Gumi plant.

Rheinmetall Defence is offering the Oerlikon MILLENNIUM naval gun system, based on the Rheinmetall Air Defence's 35mm 35/1000 revolver gun system. The system fires the Advanced Hit Efficiency and Destruction (AHEAD) 35mm x 228 multi-purpose ammunition, which forms the core of Oerlikon revolver gun Mk 2/3, SKYSHIELD/SKYRANGER fixed/mobile land-based all-weather short-range air defence and C-RAM-capable systems and the Mantis C-RAM system. The Oerlikon MILLENNIUM matches the 1000 rounds/min firing rate of the 35-mm revolver gun and AHEAD air-burst ammunition. Each round contains 152 tungsten sub-projectiles forming a lethal cone-shaped cloud ahead of the incoming target. The MILLENNIUM mounting incorporates an AHEAD computer, which measures the muzzle velocity of each projectile and then programmes the fuse using an induction coil on the extremity of the muzzle break. The high-muzzle velocity resulting in a short flight time, high accuracy, high single-burst firing rate, together with a ready-to-fire 252 magazine of AHEAD ammunition enabling multiple engagements, allows the gun to cope with a wide range of threats. On the basis of hit probability, MILLENNIUM can defeat ASCMs at ranges between 1-3 km and asymmetric threats such as multiple-axis swarms of fast attack craft up to 4.5 km, among others. MILLENNIUM does not require through-deck penetration and is available in both standard and ISO-mount installation, the latter being a container-shaped mechanical structure for rapid mounting and dismounting with an additional 252-round magazine. Capable to be controlled by shipborne advanced sensors or an optional gun-mounted small tracking sensor unit and operated as combat system-integrated weapon system, the MILLENNIUM was extensively tested and evaluated by the US Navy and its first customer, the Danish Navy. The system is also operated by Venezuelan and Indonesian Navy and has been selected by Saudi Arabia for its new Navantia-designed corvettes.



Photo: Raytheon

The Raytheon SeaRAM Mod 31/32 inner-layer defence system is equipped with an 11-round launcher for the RAM RIM-116B/C Block 1A/2 for extended ASCM coverage.

Medium Calibre Guided Ammunitions

Developed according to Italian Navy requirements, the 76/62 Single Deck system combines the 76/62 mm Super Rapido gun fire capabilities in the so-called 'Strales configuration' with conventional and Driven Ammunition with Reduced Time of Flight (DART) sub-calibre guided ammunitions with a revolutionary low-impact and light-weight installation. The latter reduces the overall gun-mount weight to around six tonnes without ammunition, almost 40%

less than the 76/62 Super Rapido with under-deck magazine and Strales ammunition guidance package. The new 76/62 Single Deck features a new gun-mount architecture characterised by a turret configuration with non-intrusive above-deck installation, where two independent ammunition magazines are installed in the elevating mass together with the self-contained Strales ammunition guidance package. The new gun turret features electrical actuators for the gun's movements and loading system. The gun mount features a reduced footprint and a stealth design



Photo: The Netherlands MoD

The Thales Nederland GOALKEEPER Upkeep (CIWS) upgrading programme is being carried out for the Dutch and South Korean navies.



Thales Nederland announced the successful passing of the first upgraded system's sea acceptance trials under the GOALKEEPER Upkeep (CIWS) upgrade programme in March 2018.



The MILLENNIUM naval gun is in service with the Danish, Venezuelan and Indonesian navies, in the latter case on board the new MARTADINATA class frigates.



The Leonardo 76/62 Single Deck system combines the 76/62 mm SUPER RAPID gun fire capabilities with conventional and DART sub-caliber guided ammunitions, with a revolutionary low-impact and lightweight installation.

extended to the gun barrel with the DART guided ammunitions' Ka-band guidance radar antenna installed behind two doors, which open when the system is operating. The new advanced single-block gun barrel without a water-based cooling system allows the same Super Rapido rate-of-fire (120 rounds/min), while due to the two interchangeable ammunition magazines, each hosting up to 38 rounds, the 76/62 Single Deck can fire conventional and DART-guided ammunitions equipped with latest 4AP smart fuse, offering increased kill probability against air and littoral targets. The gun is also suitable for long-range Vulcano 76 non-guided/guided ammunitions. The sub-calibre DART projectiles have an effective range of up to eight km and a 1200 m/s initial velocity, allowing to cover five km in seconds, which makes the system just as effective against ASCM targets as a missile but at a fraction of the cost, according to Leonardo.

Currently undergoing qualification, the 76/62 Single Deck is installed on Italian Navy's first-of-class Pattugliatore Polivalente d'Altura, launched in May 2019 and waiting for acceptance trials. Although the new weapon interfaces with the CMS and fire control system, the 76/62 Single Deck is also available in an alternative and lighter variant without the Strales guidance package. The latter capability may be provided by the ship's gun/missile fire control system (FCS), two of which are being considered: the Leonardo dual-band (X/Ka) radar/EO NA-30S Mk2 and the Thales Nederland PHAROS Ka-band radar-only FCS. Initial renderings released by the Dutch MoD and Thales Nederland of the future multirole frigates for the Belgian and Dutch navies show the new gun and PHAROS FCS, highlighting a strong interest in the binomial.

Missiles

In June 2019, the US Navy successfully tested the RIM-116C RAM in the Block 2A version, which paved the way for the first deliveries in late 2019. The Block 2A is the first of two versions of RAM Block 2's capability enhancement programme launched in FY2016. The programme aims to improve system performance against a stream raid threat scenario. Developed by Raytheon and the German RAMSys consortium (MBDA Deutschland and Diehl group's companies), the RAM/Guided Missile Launching System (GMLS) is an all-weather missile-based ILDS with an integral dual-mode (passive RF/IR) guidance, which switches to passive RF seeker after launch for acquisition lock/mid-course guidance and passes to the IR seeker head for the terminal phase. The RAM missiles are fired by the 21-round Mk 49 RAM

FIND WHAT'S NEXT IN UNMANNED

At the world's largest, most comprehensive event for unmanned and autonomous systems, you'll discover how UAS can give your critical missions an edge – your X factor. Only **AUVSI XPONENTIAL 2020** offers the opportunity to discuss real deployments, get hands-on training with groundbreaking innovations and find the systems that move your operations forward.



FIND YOUR MOMENTUM. FIND YOUR X FACTOR.

REGISTER NOW | **XPONENTIAL.ORG**



AUVSI
XPONENTIAL™
ALL THINGS **UNMANNED**

Boston Convention and Exhibition Center | Boston
May 4 – 7 | Educational Program
May 5 – 7 | Exhibits

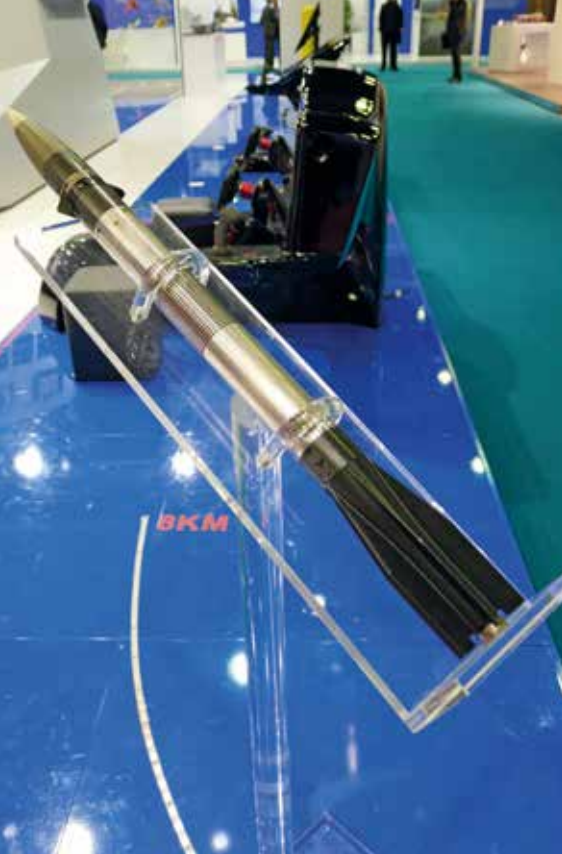


Photo: Luca Peruzzi

The Leonardo 76162 Single Deck gun system comes today with a STRALES Ka-band radio-frequency guidance kit for the DART sub-calibre guided ammunitions. The gun is installed on the Italian Navy's first-of-class Pattugliatore Polivalente d'Altura.

GMLS launcher and the Mk 15 Mod 32 SeaRAM system. In service with the US, Japan and Saudi Arabia sometime soon, the Mk 15 Mod 32 SeaRAM is based on the PHALANX Mk 15 Block 1B system mount with a RAM 11-round launcher and comes with radar/EO and inherent autonomous threat evaluation and weapon designation capability. Next to the US and Germany, the Block 1/2 RAM missile versions are used by Egypt, Greece, Japan, South Korea, Turkey and UAE and are under consideration by Qatar, Mexico and Saudi Arabia. The Block 2 version achieved initial operational capability in May 2015 and entered full production in November 2018, including new-production and renewed Block 1A munitions. The Block 2 has a larger and more powerful motor and independent four-canard control actuators to increase its effective range by 50% and deliver a three-fold improvement in manoeuvrability, a digital autopilot and enhanced passive RF seeker to defeat newer classes of ASCM. Under the Block 2 capability enhancement programme and the Fire Control Loop Improvement Project Phase 2 designed to improve coordination across all elements of US Navy's Ship's Self Defence System sensors and weapons suite, the Block 2A introduces software modifications to the RAM guidance section in order to provide multi-target processing and man-

age multiple missiles attacks scenarios. The follow-on RAM Block 2B Raid engineering change proposal (ECP) introduces an improved IR seeker and a Missile-to-Missile Link (MML) capability. Reportedly, the latter allows communications between missiles for target prioritisation/allocation against complex raid threats. According to the US Navy's FY2021 budget documentation, development flights tests are planned for FY2022.

MICA

Already in service or under delivery to eight customers, including Egypt, Indonesia, Malaysia, Morocco, Oman, Qatar, Singapore, and UAE, the MBDA VL MICA system is looking to the new-generation MICA NG missile to enlarge its customers' portfolio. The VL MICA uses the current-generation MICA munition, available with either active radar or imaging infrared seekers to provide protection out to a range of approximately 20 km. Eliminating the VLS need, the full tactical VL MICA ammunition integrates a single missile all-up-round with a single-use autonomous firing and storage canister with an integrated efflux duct, in order to vent motor efflux upwards on launch. The use of a vertical launch and the absence of dedicated target trackers provide for a 360-degree engagement capability against simultaneous and multiple targets. The new-generation MICA NG missile, of which a development and production contract was awarded by the French MoD's procurement authority DGA to MBDA as prime contractor in November 2018, will retain the same aerodynamics, mass, centre of gravity and interfaces to ensure its compatibility and also minimise the amount of adaption required to operate the new system with existing platforms and launchers. According to the

DGA, the technological improvements of the VL MICA and its ITAR-free technologies offer the MICA NG a large export market. A new dual-pulse rocket motor developed by Roxel and smaller electronic components, as an enhanced Safran inertial system, allow for more propellant and, therefore, a longer range (reportedly 30% more than the current generation) and improved manoeuvrability. The MICA NG in the IR variant features a new Safran/MBDA seeker with a matrix sensor providing greater sensitivity and countermeasures resistance, while the RF variant will feature a new active electronically scanned antenna (AESA)-based seeker, enabling 'smart detection strategies'. With a new two-way datalink, a new RF proximity fuse warhead and weapon status monitoring system, all provided by MBDA, the MICA NG retains the lock-on before/after launch (LOBL/LOAL) engagement modes and will be able to address current and future threats, with deliveries starting from 2026. Aside from the ammunition canisters themselves, the only other VL MICA's below-deck equipment is the sequencer cabinet, which links the VL MICA missiles to the ship combat management system (CMS), receives inputs from the ship inertial system, and provides the link to the Ship Missile Data Link (SMDL). The SMDL comprises a below-decks transmitter with four small uplink antennas fitted around the masthead.

MISTRAL

Developed by MBDA group as the main air defence for fast patrol boats, auxiliary and amphibious ships as well as the complementary air defence system for first-line combatant platforms, the SIMBAD-RC is a lightweight, remotely controlled, close-in defence system, which uses latest MISTRAL 3 short-range surface-to-air missile

Photo: Raytheon



The US Navy successfully completed a series of guided flight tests of the RIM-116C RAM in the Block 2A version in June 2019.

version against a range of conventional and asymmetric threats, from aircraft through to sea-skimming and manoeuvring anti-ship missiles or small-sized threats, such as UAVs, as well as small surface threats up to a range of 7.5 km, according to MBDA. The baseline SIMBAD-RC architecture is centred on up to two light-weight, gyro-stabilised launchers equipped with two 'lock-on before launch' (LOBL) MISTRAL infrared-homing missiles and a Safran MATIS SP mid-waveband thermal camera with a large field-of-view day camera, all managed by a compact terminal known as SMU-RC and interfaced with the ship's combat system or surveillance sensors. The latest MISTRAL 3 missile version is equipped with new guidance and electronics with an imaging IR seeker developed by Safran and advanced image processing capabilities enabling the engagement of low-thermal signature targets, such as small UAVs and turbojet-powered missiles in addition to excellent resistance to countermeasures, and improved range. The MISTRAL 3 also validated surface-to-surface capabilities against asymmetric threats due to new software, guidance and trajectory enhancements, demonstrating dual-role capabilities. Although MBDA has not disclosed which are SIMBAD-RC customers, ESD understands that the system is already or will be in service in single- or dual-launcher configuration with Turkmenistan, Saudi Arabia, the Philippines and has already been acquired by Senegal. Among other potential customers, ESD understands that the SIMBAD-RC (in two twin-launcher configuration) is being offered to the French Navy to protect the new BRP (Bâtiment de Ravitaillement de Force) logistic support ships under procurement. The MISTRAL 3 being launched by two refurbished Sadral remote-controlled launchers was also selected as the air defence system for the French Navy's mid-life upgrade of the LA FAYETTE class frigates. The French Navy uses the SIMBAD, SMBAD-RC and SADRAL launchers with MISTRAL missiles. During IDEX 2019, MBDA unveiled the Self-Protection Integrated MISTRAL Module, a self-contained short-range air-defence system for all-type of ships, centred on a 10' ISO standard module with two command and control operator consoles and an on-top SIMBAD-RC launcher with two missile and reserve rounds.

In November 2017, the Israel Defence Forces (IDF) declared the Naval IRON DOME, currently called C-DOME, operational after 18 months of testing on board an Israeli Navy's SA'AR 5 corvette. Based on the combat-proven land-based IRON DOME



Photo: Diehl Group

As part of RAM Block 2 missile capability enhancement programme, the latest Block 2B Raid engineering change proposal (ECP) introduces an improved IR seeker and a MML capability.

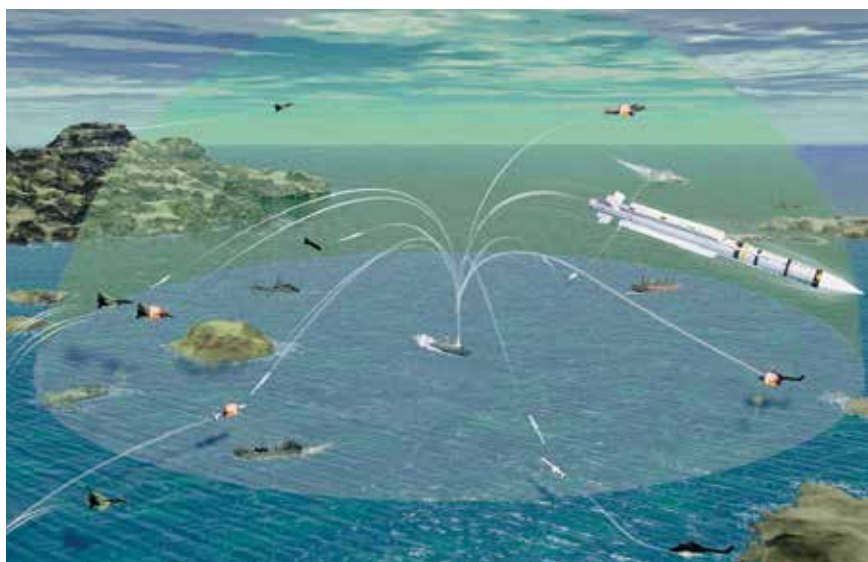


Photo: MBDA

The MBDA VL MICA system will adopt the new-generation MICA NG missile to further enlarge its customers' portfolio.

air defence system, which has achieved to-date more than 2,400 successful intercepts, the naval version was developed by the IDF and Rafael Advanced Defence Systems 'to protect strategic naval and land assets against advanced aerial, ballistic and surface-to-surface threats'. According to Rafael, C-DOME improves the capability to protect assets at sea and on land, trade routes and naval task forces, ensuring vessel protection and high-kill probability against maritime and coastal threats. C-DOME enables hemispheric protection against saturation attacks from multiple directions simultaneously, integrating into the ship's own radar and CMS. In January 2019, the Israeli MoD said that it had successfully tested an improved version of the land-based IRON DOME system and that it was likely that C-DOME will also receive these improvements. C-DOME consists of a up-to-10 round vertical launcher assemblies loaded

with TAMIR interceptors for 360-degree coverage. It relies on the ship's surveillance radar and does not need a dedicated fire control radar, while the weapon command and control unit is integrated with ship's combat management system. Rafael says the interceptors are maintenance-free and can be installed on smaller naval platforms, such as corvettes and patrol ship due to the system's reduced footprint. C-DOME was integrated for shipborne fire-trials with IAI/ELTA ELM-2248 AESA MF-STAR (Multi-Function, Surveillance, Tracking and Guidance Radar) radar, which is also integrated into the Israeli Navy's SA'AR 6 class corvettes that will receive an incremented number of TAMIR interceptors. ESD understands that the future RESHEF class naval platforms to replace the SA'AR 4.5 corvettes will also receive the C-DOME managed by Elta ELM-2258 Advanced Lightweight Phased Array rotating AESA radar. ■

Spanish Defence Industry

Esteban Villarejo

The participation in the FCAS project, the new F-110 frigates and the 8x8 armoured fighting vehicle will boost Spain's defence industry for the next decade.

According to data from the Spanish Defence Industry Association TEDAE, Spain's defence industry declined by 7.5% in 2018, reached a total turnover of €4.9Bn and employed 20,519 professionals in 388 companies.

The majority of the products and services (60% valued €2.9Bn) are destined for export. The economic downturn in Spain forced companies to look for markets abroad since the Spanish defence budget was slashed by around 30% between 2008 and 2014. Europe (84.6%), the Middle East and North Africa (8.2%) and Latin America (3.57%) are the main export destinations. Most of the defence turnover goes to a number of international consortia involving companies from other countries, including Germany, France, Italy and the UK and including programmes such as the EUROFIGHTER, the EJ2000 engine for the EUROFIGHTER, the A400M aircraft, the NH-90 helicopter and the MTR390 engine for the TIGER combat helicopter.

Sales per segment show the following distribution with regard to turnover: aeronautics (64%), land (19%), sea (16%) and space (1%). "At a national level, the change of Government in June 2018 is something that cannot be overlooked. This situation implied generating closer institutional relations with the purpose of moving forward with the approval of the so-called New Modernization Programmes of the Armed Forces", Javier Pradere, Vice-President of Tedae, told ESD.

In recent decades, efforts were made to position Spain among the few countries in the world that have an industrial fabric with companies offering the entire product cycle, from development to manufacturing, integration and maintenance.

Recently, five relevant developments occurred which are crucial for the Spanish defence industry:

First, Spain formally joined the Next Generation Weapon System (NGWS)/Future Combat Air System (FCAS) future European fighter programme. In Paris, Spain, Germany and France signed a Letter of Intent to launch the IA2 programme (research and technology activities and a demonstration

Photo: Armada Española



In 2019, the Spanish Government approved the completion of the four Navantia S-80 submarines for €1.7Bn.

phase) related to the conceptual phase of the FCAS project scheduled for May 2020. A week earlier, the Spanish Government signed the implementation agreement for the first phase. "In a third agreement, Spain will be incorporated with a 33% stake equal to that of Germany and France", Ángel Olivares, secretary of State of Defence told ESD. "For Spain, and our European partners, it is a strategic project that will involve a technological revolution, which will enable our companies to compete on equal terms with the rest of the European industry, even if they are smaller," he said. It needs to be remembered that Spain chose the technological company Indra to lead the Spanish part of the project, to the utter dismay of Airbus Spain.

Secondly, the Spanish medium companies GMV, Sener Aeroespacial and TecnoBit-Grupo Oesía reached an agreement to jointly head Spain's participation in the Remote Carrier Technology part of the FCAS project which is part of the Next Generation Weapon System (NGWS) programme. The objective is to develop new technolo-

gies and concepts which allow a set of unmanned vehicles, some of them with ISTAR observation capability, to integrate and cooperate with the new FCAS combat manned aircraft.

Third, lackluster sales of the four-engine turboprop A-400M aircraft have prompted Airbus Defence and Space to cut 2,362 jobs until the end of 2021, 630 of them in Spain. There are expectations that the Spanish Air Force might replace its 85 F-18 HORNETs, but for the time being there are no official announcements in this regard. This comes as bad news for the Spanish defence industry as Airbus is its current "engine".

Fourth, there is still no agreement on Spain's future 8x8 armoured fighting vehicle. In December 2019, the MoD shocked the industry by rejecting the offer of General Dynamics European Land Systems-Santa Bárbara Sistemas (GDELS-SBS) to produce a first batch of 348 vehicles for €2,083M, covering the 2019 to 2030 fiscal periods. The Spanish companies Indra and Sapa were involved in the programme as well.



COCKERILL® 3030 FSV-AT

COCKERILL® 3030 APC

COCKERILL® 3105

Modularidad + Comunalidad

- Mantenimiento optimizado
- Formación polivalente

→ Alta disponibilidad...

Fabricación + Integración en España

→ ... Para el soldado español

Carrera de S. Jerónimo, 15 2ª Planta • 28014 Madrid • España
Tel.: +34 91 454 70 51
Email Dirección General : mark.fenwick@johncockerill.com
Email Comunicación : nathalie.charlier@johncockerill.com

johncockerilldefense.es

 **John
Cockerill**

Following this decision, the Minister of Defence Margarita Robles announced that the Government would once again tender the contract. However, an agreement to modify the vehicle's 13 configurations could be reached in the coming weeks. The Spanish land systems industry is anxiously awaiting the launch of the 8x8 DRAGÓN contract, but the Ministry of Defence is still examining offers from French Nexter (VBCI vehicle), the Italian Iveco (FRECCIA) or the German-Dutch ARTEC consortium (BOXER), which would be a serious setback for the national industry.

Fifth, Expal Systems (Maxam's lead defence business unit) and other ammunition companies like Instalaza are suffering from the ban on exporting ammunition to Saudi Arabia. EXPAL has initiated laying off 52 stuff and closing one production facility in Spain. "This announcement is a direct response to the decline in industrial production. The company has to adapt to the market situation, as it does not expect to return to the activity level of two years ago. The company is particularly affected by the Government's changed export policy for defence equipment, which is having a significant impact on its exports to certain markets, in addition to the decline in orders from the Spanish Ministry of Defence", Expal told ESD.

The EU Opportunity

Companies like Airbus DS, Navantia, Indra, Santa Bárbara Sistemas-General Dynamics European Land Systems (SBS-GDELS), Airbus Helicopters, Expal, Sapa, Urovesa,

The Turret Question

The Spanish industry also wants to have a foothold in the turret sector for the 8x8 vehicle. Several alliances have already been established. For example, Navantia entered into an alliance with Elbit Systems (Israel) to offer an unmanned 30 mm turret. The Italian company Leonardo established a partnership with Escribano and Indra, and the Belgian company John Cockerill Defense has established an office in Madrid and is looking for facilities in Zaragoza. It has offered its 3000 Series modular turret system to the Spanish Army and the Marines. Escribano is also developing a proprietary 12.7mm weapon station.

Escribano, Thales España, Hisdesat, GMV, Sener or Instalaza have a consolidated presence in the Spanish defence programmes or exports.

"The Spanish defence industry faces the challenge of actively participating in the consolidation of the European defence market, where further internationalisation opportunities will arise. The pace at which a single European defence market is being created must be changed so that those companies that are currently less accustomed to working in this environment get used to it," says Secretary of State for Defence Ángel Olivares, highlighting the new opportunities that EU defence initiatives are likely to provide in the coming decade.

Spain is betting on projects under the PESCO (Permanent Structured Cooperation) framework. There are 18 projects in which Spain and its industry is interested: the training mission competence centre; the EU's military systems test and evaluation centre; the deployable military disaster relief capability package; a crisis response operation core; the development of an integrated unmanned ground system;

upgrading of maritime surveillance; the EURODRONE Male RPAS; TIGER Mk.II attack helicopters; secure software-defined radios; cyber threats and incident response information sharing platform; rapid cyber response teams and mutual assistance in cyber security; design of an EU operations command and control system; a European medical command; a network of logistics and operations support centres; military mobility; improved energy efficiency; sharing bases; and military radio navigation. Participation in the EU's defence measures is therefore a cornerstone of the current coalition government led by the socialist Pedro Sánchez and consisting of ministers from the Socialist Party and the radical left-wing Podemos.

The Minister of Defence is Margarita Robles, an independent Socialist Party politician with a background as a judge. During the last 18 Months, the Government has approved several major projects: the five new Navantia F-110 frigates (€4.3Bn); completing the four Navantia S-80 submarines (€1.7Bn), two new military satellites HIS-DESAT SPAINSAT and XTAR-EUR (€1.4Bn); the procurement of 23 new Airbus NH-90 helicopters (€1.3Bn); the modernisation of the EUROFIGHTER fleet (€906M) by Airbus; and the modernisation of the CHINOOK helicopters (€1Bn). The latter project is being carried out by Boeing in Philadelphia, USA, and will therefore not have a major impact on the national industry.

However, other programmes are still in the pipeline: the aforementioned 8x8 armoured combat vehicles and their turrets, new jet fighters to replace the 85 F-18 HORNET and the Spanish Navy HARRIER or a new command radio system for the entire army.

Spain's Big Seven

When looking at the seven most important Spanish defence companies, Indra certainly takes the lead. The Government, which owns 18.71% of the company's shares, has contributed to this leading role condition by appointing the company as Spanish coordinator for the FCAS project, which has

Photo: MoD Spain



The Spanish armed forces will procure a total of 1,000 PIRANHA 5 - referred to in Spain as DRAGÓN - in 13 different configurations.

caused irritation within Airbus. The company supplies proprietary technology systems to the MoD. Indra employs around 40,000 people in 46 countries and has projects in over 140 countries. It mainly focusses on air surveillance systems, electronic defence, border surveillance, simulation, satellite communications and cyber defence.

Indra is involved in many leading European projects, such as the EUROFIGHTER, the A400M, the TIGER helicopter, the LEOPARD tank, the LHD ship, the F100 frigates and S80 submarines, the GALILEO system, the COPERNICUS programme and the IN-GENIO and PAZ satellite system and the OCEAN 2020 project. It is also participating in the development of the 8x8 vehicle, the F-110 frigate, the NH-90 simulator and the Spanish Space Surveillance System, which will be one of the most powerful radars in Europe.

Navantia is the national shipbuilder wholly owned by SEPI, the Government's industrial holding. It is a world leader in the design and construction of state-of-the-art warships and in ship repair and modernisation. It also designs and manufactures integrated platform management, fire

control, command and control, propulsion and life support systems for all its products. Navantia employs 5,008 people and has a turnover of €850M. In addition to the S-80 submarines and the five F-110 frigates, Navantia is already building two Auxiliary Oiler Replenishments (AORs) for the Royal Australian Navy, a strategic customer for Navantia, from which it has received orders worth €2.4Bn in recent years for two Landing Helicopter Docks (LHDs) and three Air Warfare Destroyers (AWDs).

The President of Navantia, Susana de Sarriá, stresses the "pride of Navantia and of the Spanish industry as a whole in the international success of the company in Australia". Another important contract for Navantia is the export of five corvettes to Saudi Arabia for €1.8Bn, the largest export contract in the history of Spain's shipyards. The programme started in January, 2019 and the last ship is due to be commissioned in 2022. In addition, Navantia will be responsible for life cycle management for five years with the option for five additional years. As far as its impact on employment is concerned, it is calculated that the contract will create almost 6,000 direct and indirect jobs annu-

ally over the next five years. The corvettes for Saudi Arabia are based on Navantia's AVANTE 2200 design, which was sold to Venezuela a decade ago. Navantia has its main production facilities in Ferrol (La Coruña), San Fernando and Puerto Real (Cádiz) and Cartagena.

Airbus Defence and Space, the European leader in aerospace, employs the majority of Airbus' Spanish workforce, with nearly 7,700 employees at five sites. Airbus is one of the world's leading manufacturers of military transport aircraft and plays a leading role in the twin-engine EUROFIGHTER combat aircraft. The San Pablo and Tablada sites in the Seville area are the epicentre of Airbus' military transport business, with final assembly lines for the four-engine turboprop A-400M aircraft and the twin-engine C-295 and CN-235 transport aircraft. Seville is also home to the International Training and Delivery Centre for Airbus military aircraft. Getafe (Madrid) is the site of the A-330 MRTT Conversion Centre, where the refuelling and military avionics systems needed to convert the Airbus A330s into multipurpose tankers are being installed. Airbus also manufactures some parts for

GENERAL DYNAMICS

European Land Systems

Highest Protection Levels for Tracked and Wheeled Platforms



gdels.com

The Transatlantic Partner for Land Defense in Europe

Photo: Ejército del Aire



On 17 June 2019, the German, French and Spanish defence ministers signed a Memorandum of Understanding on the joint development of a Future Combat Air System (FCAS).

the EUROFIGHTER at Getafe. The replacement of 85 F-18 fighter aircraft over the next three to five years is one of the pillars for the next years. "The EUROFIGHTER (Tranche 3) is the most likely choice to replace these old fighters," the MoD told ESD. The Spanish Government owns 4.17% of the company's shares. However, declining exports of the A-400M will affect the company in the coming years.

Santa Bárbara Sistemas-General Dynamics European Land Systems (SBS-GDELS) employs more than 1,000 highly qualified personnel at four locations in Trubia (Asturias), Seville and Madrid. The product portfolio includes tracked vehicles (ASCOD family), wheeled armoured vehicles such as the PIRANHA, artillery systems (SIAC howitzer) and large calibre ammunition. GDELS has also received a licence to manufacture the LEOPARD 2E main battle tank or the SPIKE rocket for the Spanish Army.

SBS-GDELS expects to be awarded the contract for the new 8x8 armoured vehicle based on the PIRANHA 5; the programme is crucial to the company. Spanish Army officers have already seen the first demonstrators at the SBS-GDELS facility.

Expal Systems is MAXAM's lead defence business unit and has more than 1,300 employees, mainly in Spain but also in other 10 production centres in Italy, Bulgaria, Belarus, Denmark and the US. EXPAL's portfolio includes weapon systems, ammunition and

propellants, systems and technology applications, as well as aeronautical systems and concepts for maintenance, demilitarisation and terrain clearance. The company has one of the largest ammunition portfolios in the market and develops its own family of extended-range (ER) artillery ammunition based on base bleed technology, which provides ranges of up to 20 km with 105mm and up to 40 km with 155mm, depending on the platform. EXPAL's 105mm and 155mm artillery ammunition is used by more than 30 armies and is compatible with all NATO howitzers. EXPAL's ammunition is fully compatible with the most important naval guns such as 40mm and 76mm in all its variants, as well as the industry-leading 5"/127mm gun mountings. The Spanish company supplies more than 20 air forces worldwide with MK type ammunition (now in its 80 series), training bombs of type MK-76, BDU-33 and MK-22 as well as the penetration bomb BPG 2000 with an integrated precision-guided system.

The Airbus Helicopters plant in Albacete started operations 11 years ago. To complement production sites in France and Germany, the Albacete plant will become the company's centre of excellence for the manufacture of large component assemblies. The Spanish plant will specialise in the production and integration of the rear fuselages of all Airbus helicopters for the global market. TIGER HAD/E (attack

and NH-90 (tactical transport) helicopters for the Spanish Army are being assembled in Albacete. Two years ago, the Spanish Government approved the acquisition of a second tranche of 23 NH-90 CAIMAN helicopters for €1.3Bn. The first tranche was 22 NH-90s. The MoD predicts a fleet of 108 NH-90 helicopters – 48 for the army, 28 for the navy and 28 for the air force.

ITP Aero is currently an Original Equipment Manufacturer (OEM) in three important European defence consortia: firstly, in the EUROJET Turbo GmbH (Eurojet) consortium, responsible for the EJ200 engine and the EUROFIGHTER fighter jet; secondly, in EPI EUROPROP International GmbH (EPI), responsible for the TP400 turbo-propeller, the world's most powerful propeller, for the long-distance military transport aircraft Airbus A400M; and finally, in MTU Turbomeca Rolls-Royce ITP GmbH (MTRI), responsible for the MTR390-E rotorblades for Airbus Helicopters' TIGER, Europe's most advanced attack helicopter. In 2017, the Spanish Government approved the acquisition of ITP Aero by Rolls Royce. In 2019, Indra tried to acquire ITP Aero from Rolls Royce but to no avail. Since 2003, more than 1,200 engines have been delivered to the fleets of various nations. In addition, ITP Aero is the main supplier for engine maintenance to the Spanish armed forces.

Other Important Actors

Beside these seven large companies, there are many other smaller companies that play a role in Spanish industry, participate in Spanish programmes or export all over the world. These include: Thales España, a subsidiary of the French technology giant, with more than 1,200 employees in Spain. It is specialised in radio communications for the Spanish Armed Forces and hopes to secure another contract for the future command and control system.

Hisdesat, founded in 2001, is the Government's satellite services operator.

Babcock Spain, the former Inaer, was acquired by the British. Babcock Spain modernised the AB-212 helicopters of the Spanish Navy (with SENER) and customised and modernised the AS332 helicopters of the Spanish Army, the COUGAR 532 for UME (Emergency Unit) and S76C of the Spanish Air Force. Babcock hopes to be contracted for the Spanish Air Force training programme, similar to the French Air Force training programme.

Saes has 25 years of experience in the naval industry and specialises in underwater acoustics and electronics, systems for submarines, ships and anti-submarine warfare air platforms.

Urovesa designs and manufactures off-road special vehicles for the military. Its primary vehicle VAMTAC has been sold to the Spanish Army and exported to the Middle East and South America. Portugal also signed a contract through NATO to buy 139 VAMTAC ST5 for €60.8M.

Sener is engineering and technology company and the Spanish partner of General



Photo: Airbus DS

Final Assembly line of the EUROFIGHTER at Airbus Spain in Getafe near Madrid

Atomics Aeronautical Systems (GA-ASI) in the acquisition of four MQ-9 REAPERS by the Spanish Air Force next year. It will take part of the Remote Carrier Technology Pillar of the NGWS/FCAS project.

Tecnobit is a company active in aviation, optronics, tactical communications, secure communications, aerospace and simulation. It will also participate in the Remote Carrier's NGWS/FCAS project. Within the optronics sector, it is one of the most important global companies and the leader in Spain. The TGOR software-defined-radio is competing to be part of the Spanish Armed Forces.

Instalaza is an Armed Forces supplier with four main products: the ALHAMBRA hand grenades and rifle grenades; the ALCOTAN

system for the infantry which is fireable from confined spaces; the C-90 bazooka family and night vision devices. It exports to different countries in the Middle East, Europe and around the world.

Escribano is an engineering and manufacturing company and a systems integrator with 300 employees. A new remote control station, an infrared search and track (IRST) system, guided rocket systems, drone-hunter systems and simulation are among its products

GMV is specialising in the engineering, design, development, integration, testing, verification and maintenance of defence and security systems. It is taking part in the NGWS/FCAS project. ■



Visit us: Enforce Tac Booth nº 12-752
lequian.com

“We offer a mature modular turret system for the Spanish 8x8 vehicle programme.”

Photos: John Cockerill Defense España



Mark Fenwick, Director General, John Cockerill Defense España

John Cockerill Defense has established itself in Spain with the objective of offering its Cockerill 3000 Series modular turret system to the Spanish Armed Forces. They opened an office last year and have plans to establish an assembly line.

There are two programmes which represent opportunities for the company: the future 8x8 armoured fighting vehicle DRAGÓN for the Spanish Army; and a potential new programme to replace the M-60s vehicle of the Infantería de Marina (Marine Corps).



The Cockerill 3000 Series in the 3 versions offered to the Spanish Armed Forces (30mm unmanned, 30mm manned and 105mm manned)

“We are here because we know we have a product that is compliant with the requirements set by the Spanish Army. Our Cockerill 3000 Series modular turret system offers a single turret that can accommo-

John Cockerill has established itself in Spain to offer a product that can be produced in Spain in just months. ESD had the opportunity to talk to Mark Fenwick, General Manager, John Cockerill Defense España.

date 30mm, 90mm and 105mm weapon systems. It can accommodate a two-man crew or operate in unmanned mode with a conversion time of no more than 48 hours”, Mark Fenwick, General Manager of John Cockerill Defense España (part of the John Cockerill Group, formerly known as CMI), told ESD during an interview.

Rapid interchangeability of the crews and weapons, unique operational capacity, a very high level of common configuration... all of these qualities enable the Cockerill Series 3000 modular turrets to cover all missions and objectives on the battlefield, from engaging fighting tanks, bunkers or helicopters, to intervening in combats known as asymmetrical warfare, not forgetting urban conflicts.

“Currently, we are already producing the turret system at a current rhythm of one a day. It is qualified and it is delivered. It is not just a concept but a mature delivered product”, Fenwick explains. Indeed, John Cockerill Defense is already manufacturing hundreds of turrets for a contract with General Dynamics Land Systems Canada, in both medium and large calibre configurations. Cockerill is offering the Spanish Army other advantages: “It is about economies of scale in spare parts, training and maintenance. The turret offers a commonality of up to 75% of its subsystems and spare parts. If you are looking from a military fleet point of view we have a solution that offers economies of scale, operational performance and manufacturing in Spain. If we look at the Spanish MoD’s requirements on the one hand and our products on the other, we see a match”, Fenwick emphasises.

In 2019, Cockerill signed MoUs with three Spanish partners to optimise its defence systems: Abengoa Innovación, SDLE and ITAINNOVA (Instituto Tecnológico de Aragón). “We have to take into account that Spanish MoD wants a ‘made in Spain’ 8x8 vehicle with future export potential.”

Naturally the General Manager of Cockerill España is also a strong supporter of European solutions for defence programmes: “European companies are investing in new technologies and we

should look inside Europe for products and solutions. From a technological point of view, using non-European technologies might be a challenge when it comes to exporting”.

At this point, we have to remember that Israeli companies Elbit Systems and Rafael were chosen to provide turrets for the Technology Evaluation programme that was launched in 2015. The programme is still running and no selection of weapon systems has been made so far with regards to the production contract. The goal is to arm the future DRAGÓN 8x8 of the Spanish Army, in the scope of a programme with an initial batch of 348 vehicles: 176 units will be armed with an unmanned turret of 30mm and 56 with a manned version. This contract is valued at €2.1Bn. Cockerill believes that the requirements for a 30mm manned and unmanned version added to a potential 105mm requirement of the Spanish Marines provide a perfect match for its Series 3000 system. With regard to the DRAGÓN programme, on 23 December 2019, the Spanish MoD refused to accept the initial offer by General Dynamics European Land Systems-Santa Bárbara Sistemas (GDELS-SBS) to produce a first batch of 348 vehicles.

“These kinds of setbacks are quite normal in a programme like the 8x8 vehicle. They happen everywhere. You have ups and downs when you develop a programme. We believe that when our product is examined we will be given a chance. The solution needs to be mature in 2020 and operational for the next 30 years. It is not easy to choose”, Fenwick said. John Cockerill also promises a quick reaction if their Cockerill® 3000 Series modular turret system is selected by the MoD: “The production line could be set up in Spain in just a few months. A mature product, modularity and common configuration are unique characteristics which significantly optimise both total cost of ownership and the operational flexibility of our systems saving 20-22% over the life cycle of the product.” ■

Offshore Patrol Vessels

Market Development & Programmes

Conrad Waters

The widespread adoption of the specialised offshore patrol vessel (OPV) has been one of the key maritime developments of the post-Cold War era. Europe has been very much in the forefront of this trend.

In addition to completing numerous vessels for national requirements, European yards have also been taking the lead exporting ships and design technology overseas, gaining contracts across the world. More recently, increasing global tensions have seen the emergence of a new requirement that consolidates constabulary and warfighting requirements. Again, European industry has been prominent in responding to this need.

Market Background

The growing global presence of purpose-built OPVs in recent decades can be attributed to two main factors. One has been the near universal implementation of the United Nations Convention on the Law of the Sea (UNCLOS) III regime and, particularly, the need to police national Exclusive Economic Zones (EEZs) expanding 200 miles or more beyond a country's coastline. The other has been the end of the Cold War and the resulting imperative of establishing more cost-effective force structures. The acquisition of purpose-built ships optimised for low-cost deployment on constabulary duties in place of frontline warships was clearly attractive in this scenario. Whilst particularly influencing many European NATO countries, the shift has had global ramifications. For example, the supply of surplus, second-hand warships previously used by many developing navies to police their maritime interests steadily dried up once the major fleets completed their restructuring. The early success gained by the new generation of OPVs in performing economic yet efficient policing missions has been another important influence.

Although estimates of market size vary according to source, most commentators agree that OPVs have formed the fastest growing part of the broader naval vessels market over a sustained period of time. Numbers in service are now approaching 1,000 units, with several hundred additional vessels valued at over US\$50Bn on order or planned. Demand has typically been split between that for (i) 'high end' vessels equipped for a warfighting role and that for (ii) less complex ships intended for lower intensity policing. The former type would often have been termed light frigates or corvettes in a previous era. A cynic might suggest that the use of patrol vessel terminology for these ships frequently reflects a desire to achieve political acceptance for an expensive naval acquisition.

importance of their EEZs and the continued technical strength of the continent's shipbuilding sector. As well as fulfilling national requirements, European shipbuilders have gained particularly strong positions in export markets through a combination of outright sales and technological transfers. An examination of the current status of European-based OPV programmes therefore provides a good indication of developments in the wider market.

European-led OPV Programmes

Current European-led OPV programmes are both numerous and diverse. Inevitably, many are being undertaken by countries with extensive territorial waters, includ-

Photo: Crown Copyright 2019



The British Royal Navy Batch II RIVER class OPV FORTH seen escorting its Russian Project 22160 counterpart VASILY BYKOV in the English Channel. The popularity of offshore patrol vessels has been a feature of the post-Cold War era.

Author

Conrad Waters is a naval and defence analyst based in the UK. He is a regular contributor to Mittler Report publications and Editor of Seaforth World Naval Review.

OPVs optimised for constabulary tasking have been by far the more numerous of the two types. A noteworthy feature of this market segment has been the particular prominence of European countries in developing these new designs. In addition to the pressures driving new force structures mentioned above, this reflects both the

ing those facing the vast expanse of the North Atlantic and those that have retained overseas possessions as a legacy from colonial times. However, this has not been an exclusive precondition for participation in OPV production and countries with more limited EEZs have also been active. Another notable aspect of the

Photo: Naval Group



The French-built GOWIND type OPV L'ADROIT pictured under refit prior to its transfer to Argentina as BOUCHARD at the end of 2019. A variant of the design is a potential contender for future French OPV construction.

Photo: Conrad Waters



The lead Batch II RIVER class OPV FORTH seen entering Portsmouth Harbour in 2018. Although lightly armed, the design uses a frigate-type hull form and incorporates a capable combat management system.

market is the involvement of many smaller concerns alongside the more well-known naval shipbuilding giants. This is partly a reflection of the niche skills some specialist yards can bring to ships that are largely based on commercial design standards.

France

France has the world's largest EEZ by virtue of its numerous overseas territories and long Atlantic coastline. It is therefore, perhaps, surprising that it has lagged be-

hind many of its peers in the creation of a purpose-built OPV fleet. Other investment priorities led to the repeated postponement of a large BATSIMAR (bâtiments de surveillance et d'intervention maritime) project, which envisaged the acquisition of as many as 18 OPVs to replace a diverse flotilla of varying origins. BATSIMAR has now been replaced by a two stage approach that prioritises the renewal of patrol vessels in France's overseas territories.

In late 2019, a contract for six overseas patrol vessels – patrouilleurs outre-mer (POM) – was placed with specialist Boulogne-based shipbuilder Socarenam. Developed from three slightly smaller ships of the LA CONFIANCE class designed by the same company for operation in Guyana and the Antilles, the c. 80-metres-long vessels will combine a steel hull with an aluminium structure. Although lightly armed, the design incorporates a flight deck and hangar for a large rotary drone to meet a requirement that is becoming increasingly common in the latest generation of OPVs. Deliveries are scheduled to take place between 2022 and 2025. Attention will then shift to construction of a series of more capable, oceanic Patrouilleurs de Haute Mer that will likely be based in Metropolitan France. Ten of these are eventually planned, bringing the total number of OPVs in France's inventory to 19.

Whilst no details of the oceanic ships have yet been released, one contender is likely to be a derivative of the GOWIND type patrol vessel L'ADROIT. This design is now marketed by Kership, a joint venture formed between Naval Group and former fishing vessel specialist Piriou. L'ADROIT



herself spent several years on loan to the French Navy but has recently been transferred to Argentina as part of a deal that will see three additional vessels of the type completed by the Kership alliance. An 87-metres-long, 1,500 tonne design, L'ADROIT incorporates a 360° panoramic bridge and integrated sensor mast, the latter linked to a POLARIS combat management system that is optimised for the constabulary role. She forms part of a portfolio of Kership OPV designs that is also being actively marketed for export. In November 2019, Piriou announced the signature of a contract with Senegal for three 62 metres patrol vessels based on the Kership 58 OPV concept.

Another French company active in the OPV export markets is OCEA, which specialises in aluminium construction. The bulk of its sales have comprised smaller, fast coastal patrol craft but it has also had recent success in gaining contracts for larger vessels. December 2019 saw the delivery of its largest patrol vessel to date, the OPV 270 type GABRIELA SILANG, which was handed over to the Philippine Coast Guard. The use of aluminium offers the potential of significant savings in operating costs compared with steel vessels of a similar size and may become increasingly popular if the latest OCEA vessels prove successful.

United Kingdom

Another country with significant domestic and overseas EEZs, the UK is close to completing the recapitalisation of its OPV flotilla with the imminent conclusion of deliveries of five Batch II RIVER class ships. The ships share some similarities with an

Photo: Navantia



AUDAZ is one of a second batch of BAM type patrol vessels ordered for the Spanish Navy. Although optimised for a constabulary role, her equipment fit makes her well-suited for some higher intensity scenarios.

earlier group of Batch I and Batch I modified RIVER class OPVs commissioned into the Royal Navy between 2003 and 2007. However, they are more directly based on the three Brazilian AMAZONAS class ships that were initially destined for Trinidad and Tobago. The c. 2,000 tonne BAE Systems' design utilises a 91 metre hull with a form derived from light frigate practice and is capable of the relatively high speed of 25 knots. Other design elements that push the class towards the more sophisticated end of the OPV spectrum include use of a scaled-down variant of the combat management system fitted to frontline Royal Navy warships. A large flight deck is capable of landing a heavy weight helicopter. The ability to ship and handle various containerised equipment fits provides additional flex-

ibility. It seems the Royal Navy's present intention is to deploy the Batch II 'Rivers' to perform constabulary missions in the United Kingdom's overseas territories. Some of the earlier smaller and less sophisticated Batch I ships will be retained to police domestic waters.

In addition to the three Brazilian ships, BAE Systems have sold the Batch II RIVER design to Thailand, who have completed two KRABI class variants under licence. Both are equipped with an OTO 76mm gun and Thales Nederland TACTICOS combat management system, demonstrating the type's inherent flexibility to accept various equipment outfits.

The United Kingdom's Babcock International has also been active in OPV export, delivering four SAMUEL BECKETT class vessels to the Irish Naval Service between 2014

THE MULTIPURPOSE SOLUTION FOR MULTIPLE THREATS

Lürssen offshore patrol vessels are tailor-made, multirole platforms used for military security, marine safety and for humanitarian tasks. Besides surveillance and deterrence capabilities, they effectively counter terrorism, smuggling and piracy or other seaborne, coastal or air threats. Multi-mission modules can be tailored to your specific focus. With over 140 years of experience in shipbuilding, Lürssen builds versatile and flexible offshore patrol vessels to complete a wide range of missions.

Lürssen – the DNA of shipbuilding

More information: +49 421 6604 344 or
www.luerssen-defence.com

LÜRSEN





Photo: Conrad Waters

Portugal

The Portuguese Navy polices a North Atlantic EEZ remarkably similar to that patrolled by the Irish Naval service. Perhaps unsurprisingly, its current OPVs of the 1,900 tonne VIANA DO CASTELO class have much in common with the SAMUEL BECKETT type in spite of different design origins. This includes the combination of a large, weatherly hull with an efficient CODOE propulsion. However, the Portuguese Navy's broader range of capabilities are reflected in the provision of a flight deck for helicopter operations. The first pair of what was then intended to be an extended class was ordered from the Viana do Castelo yard in 2002 under the NPO2000 programme. However, a combination of economic and industrial problems meant it was 2011 before the first ship was delivered. A restructuring of the building yard as West Sea Viana has put the project back on track and a further pair ordered in 2015 were commissioned in 2018 and 2019. This has paved the way for plans for six more under Portugal's latest Military Programming Law.

Spain

Spain's Navantia is another major force in European OPV construction, completing

FRIESLAND is one of a quartet of Dutch HOLLAND class OPVs built by Damen. The design excels in conducting policing missions but would struggle to perform a meaningful warfighting role.

and 2018. Based on a design provided by Fincantieri's Vard Marine subsidiary, the 90 metre OPVs are large, c. 2,250 tonne ships optimised for the harsh conditions of the North Atlantic. Combined diesel or electric (CODOE) propulsion includes a power take-in arrangement from the electrical system

to maximise low speed endurance. Main armament is an OTO 76mm gun but there is neither a combat management system nor helicopter facilities. The recent closure of the Appledore yard used to build these ships may herald Babcock's exit from the OPV market.

OFFSHORE PATROL VESSELS

Class	L'ADROIT	River – Batch II	VIANO DO CASTELLO	BAM	HOLLAND	OPV80/ ARAFURA
Country (Design)	France	UK	Portugal	Spain	Netherlands	Germany
Number	1+3	8+2 [N1]	4+6	6	4	4+12 [N2]
First Commissioned	2012	2012 [N1]	2011	2012	2012	2011
Full Load Disp	1,500 tonnes	2,000 tonnes	1,900 tonnes	2,600 tonnes	3,750 tonnes	1,650 tonnes
Dimensions	87m x 11m x 3m	91m x 19m x 4m	83m x 13m x 4m	94m x 14m x 4m	108m x 16m x 5m	80m x 13m x 4m
Propulsion	Diesel, 21 knots	Diesel, 25 knots	CODOE, 21 knots	CODOE, 21 knots	CODOE, 22 knots	Diesel, 20 knots
Endurance	8,000 n. miles	5,500+ n. miles	5,000 n. miles	8,000+ n. miles	5,000+ n. miles	4,000 n. miles
Principal Armament	1 x 20mm gun	1 x 35mm gun [N3]	1 x 30mm gun	1 x 76mm gun	1 x 76mm gun	1 x 40mm gun [N3]
	1 x light helicopter	Helicopter Deck	Helicopter Deck	1 x helicopter	1 x helicopter	Helicopter Deck
Combat Management	Naval Group POLARIS	BAE Systems CMS [N3]	Limited C3	Navantia SCOMBA	Thales SEWACO	Saab 9LV CMS [N3]
Crew/Berths [N4]	30/60	60/120	45/65	45/70	50/90	40/60

Notes

N1. Three ships built for Brazil, five for the UK and two licensed for local production in Thailand; 2012 was the delivery date of the first Brazilian ship.

N2. Four ships built for Brunei and 12 ships to be built under licence in Australia; 2011 was the delivery date of the first ship for Brunei.

N3. Date relates to British and Australian ships.

N4. Approximate data. Many ships are able to accommodate additional personnel in austere conditions.

ships both for the Spanish Navy and for export. National requirements have been met by the Buque de Acción Marítima (BAM) programme. This was originally launched early in the new Millennium to replace a range of vessels. Accordingly, the intention was to produce a modular design capable of adaptation to perform a variety of distinct roles. Up to 14 ships were initially envisaged. However, Spain's past economic problems have limited production to two batches totalling six units, all completed in OPV configuration. As for the later British RIVER class vessels, these 2,600 tonne ships are relatively sophisticated units equipped with powerful combat management systems and sensors. Whilst primarily intended for constabulary duties, these capabilities place them quite close to ships intended to undertake limited warfighting missions.

This blurring of constabulary and warfighting orientation is also evident in recent Navantia export programmes. These include two quartets of BVZ littoral and POVZEE oceanic patrol vessels delivered to the Venezuelan Navy from 2010 onwards. The latter design, in particular, incorporates military capabilities such as a combat management suite and close-in weapons system. It forms the basis for five, yet more-heavily armed AVANTE 2200 vessels being built for Saudi Arabia under a €1.8Bn contract concluded in July 2018. These ships will be designated as corvettes in Saudi service.

Photo: US Navy



The Royal Australian Navy's ARAFURA class is based on the Lürssen OPV 80 design previously sold to the Royal Brunei Navy. This is Brunei's DARULAMAN.

The Netherlands

The Royal Netherlands Navy's HOLLAND class OPVs demonstrate a somewhat different design philosophy. Currently the largest European OPVs with a displacement of 3,750 tonnes, they are designed for trans-Atlantic deployment to the Dutch overseas territories in the Caribbean. Four were completed by Damen's yards in the Netherlands and Romania

from 2012 onwards. They combine the sea-keeping and endurance found in other oceanic OPVs. The sensor suite installed in an integrated Thales I-Mast provides unparalleled surveillance facilities. However, a limited armament outfit is focused on their constabulary mission. They could therefore only play a supporting role in higher intensity operations.

Although the Netherlands has now filled its national OPV requirement, Damen offer a wide range of patrol vessels for export. These range from the mainly coastal-orientated vessels of the Stan Patrol series to larger offshore types. Recent sales include two OPV 2400 derivatives being built in Romania as corvettes for the Pakistan Navy. Licensed construction has included more lightly-armed OPV 2400 variants for the Vietnam Coast Guard and three OPV 1800 types for the Malaysian Maritime Enforcement Agency.

Germany

Germany's restricted territorial waters mean there is only limited national demand for OPVs. However, two of its shipbuilders have a major presence in export markets. Most significantly, Lürssen has followed domestic construction of four 1,600 tonne DARUSSALAM class OPVs for the Royal Brunei Navy with a 2017 contract for twelve Royal Australian Navy vessels based on the same basic OPV80 design. Fabrication of the lead vessel – ARAFURA – commenced at the Osborne yard in Adelaide in November 2018.



Photo: ASMAR

The Chilean Navy's Fassmer OPV 80 type CABOT ODGER seen in the course of launch from local builder ASMAR's Talcahuano yard. The Fassmer design has been licenced for construction in both Chile and Colombia.



Photo: OCCAR

The Fincantieri-built multipurpose offshore patrol vessel PAOLO THAN DI REVEL pictured during preliminary sea trials. The modular design reflects a desire by some OPV operators to be able to flex between constabulary and warfighting roles.

However, all but the first pair will be built in Western Australia by a joint venture between Lürssen and local company Civmec. In similar fashion to many of the OPVs operated by first-rank navies, the Australian vessels will be lightly armed. However, they incorporate a sophisticated command and control system as well as helicopter landing facilities. Fellow Bremen-based shipbuilder Fassmer has also gained success exporting its own OPV80 design for licensed construction in South America. Chile's ASMAR completed four OPV80 variants between 2008 and 2017 whilst Colombia's COTECMAR has now also delivered three of the type. Fassmer has also built three similar OPV86 type POTSDAM class vessels for the German police. In an increasingly common trend, all these ships are built to a modular design and can be configured with different equipment fits.

Other OPV Programmes

Although this summary demonstrates the prominent place European companies have gained in OPV production and design, it is important to note that there are many other participants in this large and diverse market. In Asia, both China and Japan operate sizeable fleets of indigenous coast guard vessels. Indonesia has also recently developed OPVs for lo-

cal production. A noteworthy feature of Chinese and Japanese – as well as Korean – programmes – has been construction of a series of increasingly large constabulary ships capable of lengthy oceanic deployment. The China Coast Guard's CCG 2901 and 3901, delivered in 2015 and 2016, are currently the largest OPVs in the world. In North America, the large US Coast Guard is close to completing induction of the sophisticated LEGEND class national security cutters produced by Huntington Ingalls Industries as the 'high end' of its constabulary fleet. However, it has otherwise largely relied on adapting overseas design concepts to meet its requirements. For example, its latest 4,500 tonne HERITAGE class offshore patrol cutters are based on a Vard Marine 7 110 vessel, with detailed design work performed by Babcock International. Vard, alongside British design house BMT, was also involved in developing Canada's HARRY DE WOLFF class Arctic OPVs.

In general terms, few countries have matched the success of the various European manufacturers in exporting OPV designs. One significant exception has been India, which has developed significant experience in producing patrol vessels to meet its own maritime security vessels. A number of these designs have been exported to Indian Ocean fleets. These include two large 2,300 tonne

SARYU class OPVs constructed by Goa Shipyard Ltd for the Sri Lanka Navy and the GRSE-built BARRACUDA, which was delivered to the National Coast Guard of Mauritius. It seems probable, however, that competition from the main Asian builders will grow given their increasing presence in other fields of naval construction.

Future Market Trends

In addition to the likelihood of growing competition, a number of other trends are evident with respect to OPV production. One of the more significant trends is the growing importance of unmanned and autonomous vehicles in the constabulary role. In addition to help drive the quest for minimal crewing that has always been a feature of OPV operation, such assets improve a patrol vessel's ability to perform persistent surveillance at longer ranges. At present, the focus is on the operation of unmanned aerial vehicles but their surface and sub-surface counterparts are also likely to assume greater prominence. The need to find space to embark these assets is likely, in turn, to increase the emphasis on modularity that is already a feature of many recent OPV designs.

Another important trend is the blurring of constabulary and warfighting capabilities that can already be seen in some of the programmes reviewed above. The steady spread of OPV procurement into less stable regions has produced a conflict in the minds of navies attracted by the economics of patrol vessel operation but which require some of the warfighting potential of a traditional frigate. Modular design concepts may also help resolve this dilemma.

One illustration of this approach is provided by Russia's Project 22160 large patrol ships. Displacing around 1,500 tonnes, the basic design is modestly armed and minimally crewed. However, the ability to ship significant containerised weapons loads such as 'Kalibr' cruise missiles and their specialist operators offers the potential for rapid conversion into a warfighting unit. The Italian Navy's larger, 6,000 tonne PPA multi-purpose offshore patrol vessels of the PAOLO THAON DI REVEL class are similar, albeit more complex, in concept. Available in different modularised equipment fits, outfitting can range from a 'light' constabulary configuration to a 'full' warfighting vessel. The PPA itself is probably too elaborate for many navies but it seems likely the idea will have wider application. ■

Anti-Ship Missiles

Market Outlook and Programme Review

Bob Nugent

The global naval market for anti-ship missiles has entered a transition phase as established market leaders such as Boeing's HARPOON and MBDA's EXOCET compete against a growing number of increasingly capable, lethal, and inexpensive rivals offered from the US, Europe, China, and Russia. This article reviews the current and future prospects for naval ASuW missile in the global market.

These traditional offerors are joined by companies and countries such as India and Korea that have developed local ASuW missiles and bring them to the market with alternative supply chains, fewer export restrictions, and favourable trade terms. The ASuW market is influenced by three strategic trends that are reshaping naval force structures. The first is the overall reduction in naval ships and submarines in service, a result of the continuing retirement of ships that were brought into service during the Cold War or in the decade after. Those ships are now reaching 30, 40 and in some cases 50 years of service and are in large part incapable of serving much longer. With fewer ships in service, naval planners will be pressed to decide which of those fewer ships will be equipped with new ASuW missiles.

Overview

The second trend is the increasing capability and dispersion of the new ships and submarines that are being built today. More navies are acquiring the kinds of ships, and ASuW missiles that in previous decades were concentrated among fewer navies. This trend has the two-fold effect of in-

Photo: MBDA



The EXOCET MM40 Block 3

creasing the market opportunity for ASuW missile suppliers, and increasing the likelihood that ASuW missiles will be used in active operations.

Lastly, technology has fundamentally changed the conditions and constraints of ASuW missile design. Advances in communications and information technologies are clearly seen in the increasing number of "fire and forget" ASuW missiles that no longer depend on launch platform or other guidance support to strike targets at increasing ranges. Changes in propulsion and materials will contribute to the development of new hypersonic missiles that combine the speed of ballistic missiles and the manoeuvrability of cruise missiles. Lighter and stronger materials technologies also make ASuW missiles smaller and faster, with gains in range and an expanded number of options for smaller and non-traditional launch platforms – ships, submarines, ground vehicles and aircraft.

Amidst these strategic market and technology trends, the prospect that naval ASuW missiles will see active use in combat appears to be growing at both ends of the naval conflict spectrum. ASuW missiles have been used in local and regionalised conflicts involving terrorist groups and non-state actors, with the conflict in Yemen a notable recent example. The growth in (return of) great power competition at sea is

also driving a renewed focus on offensive naval warfare at sea. The US Navy's Offensive Missile Strategy that shapes research and development and procurement policies for ASuW missiles is one example of this phenomenon.

This article reviews the current and future prospects for naval ASuW missile in the global market. It draws on AMI International's proprietary naval market reporting and forecasts to review today's naval ASuW missile market, with a focus on strategic changes in naval ship inventories and the prospects for modernizing ASuW batteries on existing ships. The article will next review the status of several new missiles now in service or expected to join active fleets over the next 5 years. Lastly, the article will consider what the ASuW market looks like over the next two decades from the perspective of AMI forecasts for new ships and submarines to be built through 2040.

Current Market

AMI's Existing Ships Data Base (ESDB) tracks all ships assessed as currently commissioned and in service across the world's navies and other agencies and services that operate maritime platforms. As the table below shows, today's inventory of naval ASuW missiles is concentrated in a small part of most navies (702 out of 12,770

Author

Bob Nugent is a recently-selected Scholar Practitioner Fellow and Instructor at the Busch School of Business at Catholic University of America, (Washington D.C.), as well as Ph.D candidate in Strategy and Management at Virginia Polytechnic University. He continues to work as a consultant and writer/commentator in the Aerospace and Defense industry, affiliated with AMI International. Bob is a retired naval officer.

ships carry ASuW missiles – just over 5% of the global inventory of active surface ships). And among the ship types that do mount such missiles, less than 20% of those types are so equipped.

Vessel Type	Ships in Service with ASM	Total # of Active Ships	%
Auxiliary	3	1574	0%
Corvette	114	317	36%
Cruiser	22	28	79%
Destroyer	95	195	49%
FAC	231	853	27%
Frigate	232	414	56%
OPV	5	475	1%
Total	702	3856	18%

Destroyers, Frigates, Corvettes and FACs account for 65% of all ship types equipped with ASuW missiles, and those four ship types represent about 95% of the potential ASuW missile modernisation market. Among the four, the frigate stands out as the leader. This is not surprising as the frigate represents the largest and most capable ship for many navies. Among even the

larger and most modern navies, the frigate remains the “workhorse” (in ship numbers and missiles aboard) of the ASuW mission. Taking a closer look at what types of ASuW missiles are found in today’s navies, AMI data shows that the HARPOON and EXOCET continue to be leaders for market share. AMI shows 322 ships worldwide equipped with the HARPOON, with most concentrated on larger surface combatants. The EXOCET equips smaller ships; Fast Attack Craft and Corvettes together make up almost 75% of the 191 surface ships AMI reports as carrying the EXOCET. Combining the data from both charts, of the 702 ASuW -equipped surface ships now in active service, almost 73% of those are carrying either HARPOON or EXOCET. While EXOCET and HARPOON hold a strong position in the current market, it is not uncontested. The Kongsberg/Raytheon Naval Strike Missile, Italian OTOMAT, Israeli GABRIEL, Swedish RBS-15, and Indian-Russian BRAHMOS taken together represent the ASuW main battery for more than 100 surface ships worldwide, together representing about 10% of market share. That percentage is expected to grow as navies look beyond the current HARPOON and EXOCET solutions. Chinese and Russian (and Iranian and North

Korean) ASuW missile-equipped ships, not included in the tables above, number in the hundreds.

ASuW Missile Modernisation

The chart below provides a finer-grained analysis of the other types of missiles in service today. When measured by the number of ASuW missile cells on existing ships (and ships can have from one to dozens of ASuW missile cells), EXOCET has about 23% of the existing surface ship ASuW missile market, and HARPOON makes up more than half of the existing market share of naval ASuW missile cells, similar in trend to the figures for surface ship market share.

From a regional perspective, today’s ASuW market is led by the Asia and Australia and NATO/Europe areas. Each region accounts for about 30% of existing ship-based ASuW missiles each. The share of ASuW missile-equipped ships also varies by region – lowest among Sub-Saharan African countries (less than 2%) and highest in the MENA region and among European fleets (about 9% each).

As noted in the introduction, a significant portion of the current base of ASuW missile capable ships is projected to be retired

# of Shipboard Cells for ASM	Asia & Australia	Caribbean & Latin America	Middle East & North Africa	NATO	Non-NATO Europe	Sub Saharan Africa	USA	Cell Total
EXOCET (MM 38)	66	74	24	44		12		220
EXOCET (MM 40)	92	156	330	164		32		774
GABRIEL	9	16	48					73
HARPOON (RGM-84)	696	48	232	952			400	2328
MARTE (Sea Killer Mk 2)	12		48					60
NSM				80				80
OTOMAT / Teseo	68	84	64	84				300
PENGUIN				12				12
RBS 15			16	38	104			158
SEA SKUA			32					32
SSM-1 (Type 90)	184							184
SSM-700K / Haeseong	176							176
Totals	1303	378	794	1374	104	44	400	4397
# of Ships in Service	4534	1309	1488	2395	358	398	865	11347
# of Ships w/ ASMs	212	75	134	207	17	7	50	702

in the next 20 years. Worldwide through 2040, the 11,347 ships and craft now in service is expected to fall by almost 25% to 8,500. As the costs of procuring new ships with missile capabilities continues to rise, those leaving service will not be replaced on a one-for-one basis. Since navies are facing increased missile threats and geopolitical challenges in those coming two decades, they will look to preserve or expand their offensive anti-ship capability of ships and submarines remaining in service. This will make modernisation of ASuW capability among ships retained on active duty increasingly urgent.

This urgency is somewhat offset by expanding options for ASuW missile launch from other platforms – especially fixed wing aircraft and helicopter, as well as land-based mobile launchers. However, those options are not free, and will still pose a challenge in deciding where to allocate investments in new ASuW missile capability across the portfolio of launch platforms, many of which are not part of countries' naval forces, but rather are integrated into air or ground forces.

The size and weight of ASuW missiles and associated sensors on these platforms will also remain a critical issue when looking at modernisation opportunities. This is especially true of smaller ships such as corvettes and Fast Attack Craft (FAC) with limited space to accommodate larger missiles or more missiles. This market dynamic favours modernisation solutions for missiles of the same or smaller dimensions than those they are replacing.

The size issue also helps explain why the EXOCET and GABRIEL – on the small end of the global arsenal of ASuWs – continue to have the large market share on FACs. Larger ships, from destroyers to frigates, offer more capacity for missile upgrades. These types of ships can take larger missiles, but as those missiles are mostly mounted in multi-cell canister configurations, most navies are likely to prefer upgrades that do not require wholesale replacement of launchers as well as missiles.

ASuW Missile Market: Strategic Drivers

As noted above, the ASuW missile continues to evolve rapidly in many technical and tactical characteristics. The first ASuW missiles introduced in the 1960s relied on radio command guidance, requiring a continuous signal to track to the target. Now most ASuW missiles operate independently after launch, using on-board radars for active homing (together with inertia guidance systems on the missile), as well as passive



Photo: Raytheon

The Kongsberg/Raytheon NSM

infra-red and electro-optical seekers. With increasingly lethal warheads, high speed and manoeuvre, and increased range, the current and coming generations of ASuW missile pose an existential threat to most surface ship targets. And at lower costs of acquisition offered by some suppliers, they continue to represent an excellent capability return on investment to either control or deny maritime operating space to potential opponents.

Some of the strategic conditions shaping the future ASuW missile market include the renewed focus on great power rivalries, and the maritime setting in which many of these rivalries are likely to play out. Many navies are increasing focus on such contingencies as shown in planning, exercise scenarios and training. This "catch up" in ASuW capability and proficiency comes after a prolonged post-Cold War period in which many navies under-invested in ASuW capability in favour of other more pressing concerns related to supporting operations ashore or addressing maritime security and humanitarian mission requirements.

At the operational level, the continuing reduction in naval force structures also shapes requirements for both capability and numbers of new ASuW missiles to be acquired. In the past 30 years, the number of surface combatants with ASuW missiles has fallen by 30% or more. The case of the Royal Navy illustrates this. Until 2017, the Royal Navy was facing the prospect of retiring the HARPOON Block 1C by 2020 with no replacement. The UK has taken steps since to extend the service life of the missile through 2023 and is now actively reviewing replacement options under an "Interim Surface to Surface Guided Weapon (ISSGW)" programme. Still, the number of RN ships that are funded for a HARPOON replacement are small – in the case of the ISSGW program, as few as five frigates. In the US Navy, only Flight I and Flight II ARLEIGH BURKE class destroyers

are HARPOON-capable: 28 out of the 76 ships in the class. And while equipping the LCS with NSM will address this shortfall somewhat, sustaining a high-intensity surface combat contingency would likely quickly stretch ASuW capabilities of virtually all navies today.

Selected ASuW Missile Programme Highlights

Boeing HARPOON Block II and Block II Plus

The HARPOON Block II missile has been in production since 2011. The Block II+ is described as a "rapid-capability enhancement" with new a GPS guidance kit and new data link interface for in-flight updates, improved target selectivity, an abort option, and enhanced resistance to electronic countermeasures. In January 2019 the US Navy ordered 79 HARPOON Block II Plus tactical missile upgrade kits.

Lockheed Martin LRASM

The Long-Range Anti-Ship Missile (LRASM) is offered as a replacement for the HARPOON and is based on the JASSM-ER cruise missile used by US Air Force. The missile is reported to have ranges up to 500 miles. The LRASM Increment 1 reached Early Operational Capability Status with the US Air Force in Fiscal Year 2019 and with the US Navy (F/A-18 aircraft) in early 2019. A ship-based variant of the LRASM to be launched from the Mk41 VLS system is under development, with initial test launches from a ship-based test platform conducted in 2018. In 2018, Lockheed Martin representatives states the company was self-funding development of a deck-mounted launcher for the LRASM to make it available on ships not equipped with the VLS. In the US, the target market for this version of the LRASM appears to be large amphibious ships.

Naval Strike Missile (NSM)

Norway's Kongsberg Naval Strike Missile is a slower but stealthy missile equipped with passive sensors and a turbofan motor to reach targets up to 185 km away. The related Joint Strike Missile jointly developed



Photo: Boeing

The Boeing HARPOON

by Raytheon and Kongsberg will equip the F-35. In October 2019, the LCS USS GABRIELLE GIFFORDS conducted a live launch of the NSM at a decommissioned target ship. The NSM has enjoyed considerable export success, with sales to the Royal Malaysian Navy (NSM to equip the RMN LCS) and Romania. The NSM will also replace the HARPOON on the German Navy's F123, F124, and F125 class frigates.

MBDA EXOCET MM40 Block 3

The EXOCET MM40 Block 3 weapon system is the latest ship-based version, and MBDA states the missile has a range of up to 200 km. Press reports indicate the French Navy will take delivery of the first MM40 Block 3C in 2021, with between 35 – 55 missiles to be acquired. In addition to the French Navy, the Block 3 equips navies in Greece, the UAE, Chile, Peru, Qatar, Oman, Indonesia and Morocco.

IAI GABRIEL V

In 2018, Finland selected IAI's GABRIEL V missile to replace its local version of the Saab RBS15 now on Finnish surface ships, expected to be retired from service within five years. The GABRIEL V competed against the Kongsberg NSM, MBDA EXOCET, Boeing HARPOON, and Saab RBS15. In December 2019, the Finnish Navy website disclosed the GABRIEL V will be designated locally as the "2020 system." The

GABRIEL V will be part of a mid-life upgrade of Hamina-class fast attack craft as will be installed on future POHJANMAA class corvettes. Open source reports state the GABRIEL V has a range of over 200 km, length of 5.5 metres, weight of 1250 kg, and is subsonic with an active radar seeker and advanced electronic countermeasures (anti-jam). As earlier variants of the GABRIEL are in service with a number of navies world-wide, the initial export of the GABRIEL V may signal an opportunity for additional refits in other fleets.

BrahMos

The joint Russian-Indian PJ-10 BrahMos is claimed to have a range of up to 500 km, based on a two stage propulsion plant combining solid fuel and liquid fuel to achieve supersonic speeds. An upgraded BrahMos II is under development and is scheduled for testing in 2020. The BrahMos equips Indian Navy ships (RAJPUT class destroyers, TALWAR class frigates) and is said to be under consideration by several other navies. At the May 2019 IMDEX event in Singapore, a representative of BrahMos Aerospace stated the missile was ready for export to a Southeast Asia country and awaited government to government approval of the agreement. Statements from Philippine officials in December 2019 announced the country "is prepared to acquire" the land-based version of the missile in the first half of 2020, with up to two batteries to be exported.

Hypersonic ASuW Missiles

Russia is investing significantly in this capability, with the Russian Navy working to field the TSIRKON (ZIRCON) hypersonic ASM after 2020 on modernised cruisers (KIROV class) as well as the smaller frigate classes (GORSHKOV and ADMIRAL GRIGOROVICH classes) that are being built now. If developed to operational capability, the missile could also equip newer corvettes that are fitted with KALIBR missile. The Chinese Navy also has plans to field a hypersonic ASM during this decade.

Market Outlook

What does the future hold for the surface combatant ASuW missile market? Still more new designs and missile types for one. The US award to the Raytheon-Kongsberg team offering the Naval Strike Missile for the US Navy's LCS Over-the-Horizon Weapons System (OTH-WS) highlights a strong contender to equip the US Future Frigate and ships of similar size and mission. AMI's

WNPR highlights an ASuW missile market segment characterised by sustained steady growth. Some 6000 new ASuW missiles are expected over the next 20 years, with about two-thirds of this demand expected to materialise in the next ten years. While perhaps half of this future demand represents acquisitions by closed markets such as China, Russia, Iran and North Korea, there is still a significant and sustained market opportunity for missile suppliers.

These missile market projections also fit with the latest AMI forecasts on major surface ship acquisitions over the coming two decades. 400 new cruisers, destroyers and frigates are expected to join navies world-wide in that period, with almost all ASuW missile-equipped. Another almost 350 new corvettes and fast attack craft, most carrying ASuW missiles, are forecast for the same period.

With "high end" naval conflict scenarios appearing more likely, while naval missile threats to surface ships increase in numbers and capabilities, demand will go up for the next generation of new missile launcher designs. These will use new materials and structures that go beyond current box/canister and vertical launch systems. However, core engineering in areas such as ablatives and safety systems are expected to carry over to future ship-based launchers.

And while next generation ASuW's will take an increasing market share, the HARPOON and EXOCET are not done yet. BAE's win in the Australian frigate competition with the "GCS-A" will include HARPOON fits. The Royal Navy itself, while committed to a HARPOON replacement in the out years (2030). As noted, the RN will extend the service life of HARPOONS while evaluating replacements. The Canadian Surface Combatant ASuW missile fit will also likely be equipped with HARPOON, given that the HARPOON is now in service on the Halifax class frigate.

Summary

In summary, the coming decade promises to be an interesting one for the shipborne ASuW missiles. The 1960s and 1970s represented an intersection of technology advances (propulsion, guidance and sensors), geopolitics (the Cold War) and new operational concepts (making ships capable of engaging other ships beyond gun and torpedo range). This led to the development of the first generation of ship-based ASuW missiles like HARPOON and EXOCET, which have significantly altered the naval art in the decades since. A similar confluence of forces appears to be taking place today, and will further change naval anti-surface warfare. ■

2020 BSDA

Black Sea Defense & Aerospace
EXHIBITION & CONFERENCE

8th Edition



Bucharest - ROMANIA

May 20 - 22, 2020

Organizer:



Supported by:

MINISTRY OF
NATIONAL DEFENSE

Venue:

ROMAERO

Stand bookings and additional information: bsda@tntexpo.com / +40 21 321 6651 / 0

www.bsda.ro

“The Armed BLACK HAWK is well-suited for militaries that may not want to field a dedicated attack helicopter.”



Photos: Photos: Lockheed Martin

John Lopes



Adam Schierholz

Some Latin American states want to renew their fleet of helicopter platforms. However, the requirements of these countries for helicopters are quite different from those of NATO states. The American manufacturer Lockheed Martin has been active in this region for decades. ESD had the opportunity to talk to John Lopes, International Director for Latin America and the Caribbean at Lockheed Martin, and Adam Schierholz, Vice President & Regional Sales Executive – Latin America at Sikorsky Aircraft

ESD: For decades, Sikorsky has been a trusted provider of helicopter solutions for Latin American security forces and civilian customers. What are the main programmes in which the company is currently involved? What is on the horizon? With what upgrades or new solutions is Sikorsky planning to meet new requirements?

Schierholz: Sikorsky remains fully engaged with all current operators of Sikorsky helicopters in the Latin America region. This ranges from the largest military operators – each of the three forces in Colombia (Army, Air Force and National Police) with 96 BLACK HAWK aircraft; each of the three forces in Mexico (SEDENA, SEMAR, and Federal Police, now the Gendarmerie Division) with 47 BLACK HAWK aircraft; and each of the three forces in Brazil (Air Force, Army and Navy) with 20 BLACK HAWK and 6 SEAHAWK helicopters. We also support our vast commercial fleet of S-76 and S-92 helicopters in Brazil, Trinidad, Mexico, Guyana, Argentina, and now Peru.

We support the region's BLACK HAWK fleets from our primary military support hub in Colombia. Sikorsky-Colombia has offices in Bogotá, operates an MRO depot in Tolimaida, and a UH-60 flight simulator in Melgar. We support the region's commercial fleets from our hub near Rio de Janeiro, Brazil, where we operate a parts warehouse and blade repair facility.

One of our newest programmes is the delivery of six S-70i aircraft to the Chilean Air Force in late 2018. Those aircraft are performing exceptionally well for their intended roles of search and rescue, humanitarian

relief and general utility operations. Also, a M28 fixed wing STOL airplane produced at our PZL Mielec facility in Poland is operational with the Ecuador Army.

With regards to upgrades and new solutions on the horizon, we are very excited about two recent mission systems — an advanced armed system and an improved aerial firefighting capability for the S-70i BLACK HAWK. For armed missions with the third generation S-70i and UH-60M BLACK HAWK helicopters, pilots can place machine gun rounds, rockets and missiles onto targets effectively and accurately. That's because the weapon system is fully integrated with the cockpit avionics, which computes the complex ballistics. The Armed BLACK HAWK, as we call it, is well-suited for militaries that may not want to acquire, field or maintain a dedicated attack helicopter platform. The advantage of the Armed BLACK HAWK is that you don't have to choose between missions – you can perform both utility and armed functions with the same aircraft. This saves sustainment cost by minimising parts, training and ground support equipment. The recent announcement by the Brazilian Army that they would combine their future Armed Helicopter Programme with their Manoeuvre (Utility) Helicopter Programme shows they're thinking the same way.

The Armed BLACK HAWK – equipped here with HELLFIRE missiles, HYDRA rockets, and two types of machine guns – 50-cal (12.7mm) and 7.62-mm mini-gun

Our S-70i FIREHAWK helicopter is born a BLACK HAWK. We have an approved third party to attach a 3,785-litre external water tank to the belly of the aircraft. The Los Angeles County Fire Department has pioneered fire attack for almost 20 years with three S-70 FIREHAWK aircraft, which assist firefighters on the ground to extinguish flames quickly and safely. This has proven to be the most effective aerial method to at-



tack the growing problem of wildland fires. The FIREHAWK helicopter's external water tank can be retrofitted to existing BLACK HAWK aircraft, which retains its utility functions. We see a need for the FIREHAWK capability in Latin America, especially given the region's intense and varied climates, many of which are conducive to wildfires.

On the new technology side, Sikorsky is maturing a next-generation X2 helicopter design that uses a co-axial rotor configuration and a pusher propeller to generate flight speed up to 220 knots and greater manoeuvrability compared to a conventional single main rotor helicopter. We are testing two aircraft prototypes – the single engine S-97 RAIDER helicopter weighing just over 11,000 pounds, and the twin-engine SB-1 DEFIANT helicopter in the 30,000-pound class. Developed initially for the US military, the X2 design represents the long-term future of rotary wing flight.

ESD: Sikorsky has a strong footprint in Colombia: for example, it runs a BLACK HAWK maintenance and training centre. Who benefits from this facility, beyond the Colombian Armed Forces?

Schierholz: We are very proud of what we have developed through the years in Colombia in cooperation with the Colombian Government. Sikorsky-Colombia is really a testament to a well prepared, strategically planned industrial cooperation programme. Originally, Sikorsky-Colombia was established in 2012 as a three-person team installing and running the only six-axis, full-motion BLACK HAWK simulator outside the US. This was part of an offset requirement tied to a contract win a few years earlier. This became even more important as the need increased to train pilots cost-effectively for the BLACK HAWK aircraft acquired by the Colombian armed forces and police. Sikorsky saw a win-win opportunity to establish a depot maintenance centre with our Colombian customers. What started as a three-person team is now 36 people doing training and depot work, as well as much of the associated engineering, quality, supply chain, and logistics. Of those 36 employees, 34 are Colombian – which is a win-win for both Sikorsky and the Colombian MoD, and the Colombian economy in general. All Sikorsky customers in the region benefit from this activity, since we have transferred mechanics and engineers from Sikorsky-Colombia for work in Chile, Brazil, and Mexico. What is more, customers from Chile, Mexico and Brazil have been trained in our flight simulator as well. It has been very gratifying to see the vision for Colombia come to fruition as the hub of our regional BLACK HAWK support.

ESD: A prerequisite for a strong partnership in defence procurement is usually (and not only in Latin America) that the foreign company involves regional partners and offers, for example, MRO services or local content. In some cases, it may even include local production as part of the business. What is Lockheed Martin's strategy to meet the customer's desire for work-sharing and/or technology transfer?

Lopes: There are two primary things that distinguish us from our competition: First, we truly seek to define programmes with the customer that will provide long-term benefits to the customer and the country itself. What we have done in Colombia is a testament to that. Secondly, we do what we commit to do, plain and simple. Our customers have told us they really value that quality. We have a sterling reputation in the region and around the world for keeping our commitments to involve the local workforce or local industry. We are considered a trusted global partner, and we believe that to our core.



Lockheed Martin's C-130 HERCULES has already served 11 Latin American nations for more than 50 years. The latest C-130J SUPER HERCULES variant offers operators certified multi-mission versatility and proven operational performance.

ESD: The military's role in Latin American countries is very different from the role commonly found in the northern hemisphere - in NATO. It is less focused on defence against a foreign enemy and more on civil security tasks such as fighting organised crime, border management and disaster relief. What does this mean for the technological solutions that the armed forces are looking for and for a company like Lockheed Martin that provides these solutions?

Lopes: You are correct in that observation, and this strengthens the argument for robust, multi-use platforms like the BLACK HAWK or C-130 HERCULES. Both are mainstays of conventional forces' air mobility and combat power around the world, and both have been involved in life-saving missions like the C-130s of multiple nations that deployed to Peru to assist in the relocation efforts of Peruvians trapped by the flood waters of El Niño. The ability of the C-130 to land on short, non-conventional landing areas with 64,000 lbs. of cargo or 92 passengers provides their operators with a tremendous capability where and when it is needed. A smaller, fixed wing aircraft of ours – the M28 – is similarly capable of operating from the world's most inaccessible airstrips, grass or gravel runways. Brazilian BLACK HAWK helicopters rescued three civilians following a tireless, 36-hour search off the coast of Cabo Frio. They were recognised in 2017 with the American Helicopter Society International's prestigious Kossler prize. Rear Adm. Montenegro, commander of Brazil's

Naval Air Force, said: "This rescue is proof of the crew training excellency and the aircraft's efficiency. We thank Sikorsky for the partnership in maintaining and operating this capable helicopter."

ESD: Some South American countries, particularly Chile, Brazil and Argentina, have very long coastlines and commercial offshore activities that need to be protected. What does Lockheed Martin offer in this area?



Lockheed Martin Canada was selected in 2017 to be the combat systems integrator for the Chilean Navy's three Type 23 frigates, leveraging its Canadian-developed CMS 330 combat management system.

Lopes: Lockheed Martin has a variety of air, sea, land platforms and command and control systems that provide world class capabilities and integrate multiple legacy and third party systems and sensors. These build a picture of knowledge and actions that assure your as-

now also operated by Australia, Saudi Arabia and Denmark. This advanced maritime helicopter can operate from frigates, destroyers, cruisers and aircraft carriers. More than 300 SEAHAWK helicopters of all variants are currently in use around the world today.



With approximately 3,000 operational F-16s in service today with 25 countries, including Chile, the F-16 remains by far the most prevalent 4th Generation fighter. The aircraft has been continually upgraded and is therefore suitable to meet the demand of new customers worldwide.

sets are protected. In terms of at-sea operations, Lockheed Martin Canada was selected in 2017 to be the combat systems integrator for the Chilean Navy's three Type 23 frigates, leveraging its Canadian-developed combat management system, CMS 330. This selection builds on the longstanding relationship between Chile and Canada and the countries' two navies, as well as Lockheed Martin's expertise in naval systems integration and support for interoperability between allied countries. In the air, Brazil operates S-70B SEAHAWK helicopters for anti-submarine warfare and anti-surface warfare. The US Navy's SEAHAWK aircraft is the MH-60R,

For long-range search and rescue and surveillance missions with BLACK HAWK aircraft, militaries can add easily wings or pylons that carry external fuel tanks.

ESD: Chile is one of the 25 user nations of the F-16. Is this aircraft an option for other Latin American air forces as well? What are the new capabilities offered by the latest Block 70/72 configuration?

Lopes: The F-16V Block 70/72 is the most capable 4th Generation fighter jet in production and has an unmatched record

for combat performance throughout the world. Because we have continually upgraded the platform, we have seen a resurgence in interest for this aircraft's production, with new orders from Europe, Asia and Africa. We are confident we will continue to provide this capability to our partner nations for years to come.

ESD: We already talked about your strong footprint in Colombia. The Lockheed Martin subsidiary, DERCO, is another established player in the region. What are its core activities in Latin America?

Lopes: For more than 35 years, Derco has provided fleet management solutions, spares distribution, technical solutions logistics and technical support for fixed-wing aircraft. Now part of Lockheed Martin, Derco supports global military efforts in 65 countries and is an important part of our C-130 fleet support, among other aircraft in the region.

ESD: In ten years' time, when you look back on the 2020s, what will be Lockheed Martin's summary of this decade with respect to Latin America?

Lopes: We want Lockheed Martin to be seen as a valued technical partner to the nations and industries of Latin America, with unique security and civil support solutions tailored to the region. And we aim to

provide missions solutions that equip Latin American militaries with the capacity to defend their national sovereignty as required.

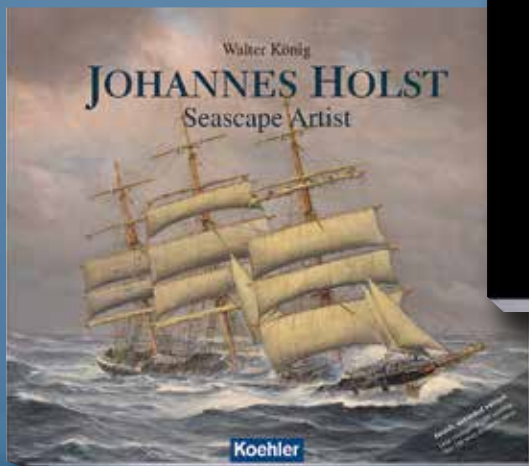
Schierholz: Our statement "Your mission is ours" is very much part of this ethic, emphasising as it does our innovative spirit and employee commitment to mission success.

The interview was conducted by Peter Bossdorf.

BOOKS Koehler

.....
EXCITING INSIGHTS INTO MARITIME ART & HISTORY

**ORDER
NOW!**

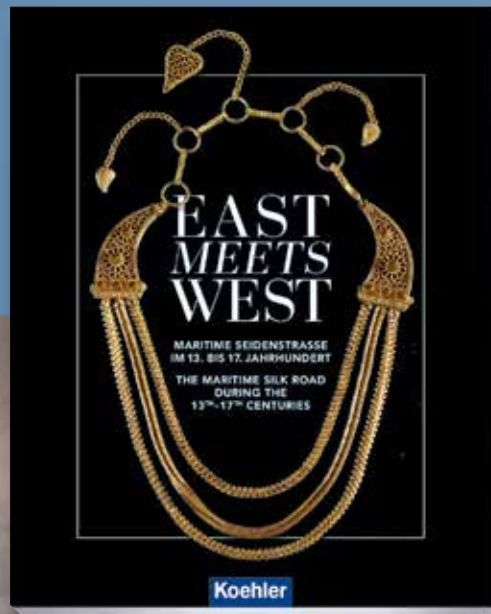


Walter König

JOHANNES HOLST

Seascape Artist

Hardcover • 29,5 x 26 cm
1.400 photographs • 456 pages
English language edition
€ (D) 148,00
ISBN 978-3-7822-1323-3

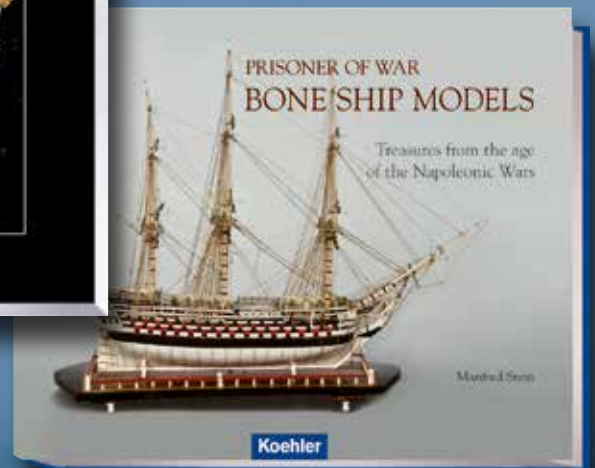


Internationales
Maritimes Museum
Hamburg (Hrsg.)

EAST MEETS WEST

The Maritime Silk Road
during the
13th – 17th Centuries

Paperback • 21 x 26 cm • 160 pages
Bilingual German / English
€ (D) 19,95
ISBN 978-3-7822-1295-3



Manfred Stein

PRISONER OF WAR – BONE SHIP MODELS

Treasures from the age
of Napoleonic Wars

Hardcover • 30 x 24 cm • 408 pages
English language edition
€ (D) 128,00
ISBN 978-3-7822-1205-2

AUTO • FOTOGRAFIE • GENUSS • GESCHICHTE • HAMBURG • KALENDER • KREUZFAHRT • KUNST • MUSIK • REISE • SCHIFFFAHRT • TECHNIK

Koehler
koehler-books.de

DefExpo 2020 – A Wrap-Up

Suman Sharma

The 11th edition of DefExpo 2020, the flagship biennial event of India's Ministry of Defence (MoD), is one of the largest events of its kind. Held in Lucknow, Uttar Pradesh (UP) from 5 to 9 February 2020, the event saw at least 200 partnerships being signed.

These partnerships take India closer in realising the theme of DefExpo, which was that of becoming a 'Facilitator and collaborator in defence production', rather than just having a buyer-seller relationship. About 1,000 companies participated in DefExpo, with 165 foreign companies coming from 70 countries. Service Heads of 35 countries participated in the exhibition. Indian Defence Minister Rajnath Singh described the signing of partnerships as a step in the direction to achieving Prime Minister Narendra Modi's US\$5Bn defence exports target in the next five years.

The sub-theme of DefExpo 2020 was 'Digital Transformation' of the future battlefield and it focussed primarily on manufacturing for the aerospace and defence sector through application of newer technologies. In addition to exhibiting products and technologies and live demonstrations by the Services, Defence Public Sector Undertakings and industry showcased the land, naval, air and internal security systems. The 'India Pavilion' showcased the jointness between the public and private sector, including Small and Medium Enterprises/Micro, Small and Medium Enterprises and innovation eco-system.

The Indian Government set up two Defence Industry Corridors, one in the northern State of UP, of which Lucknow is the capital, and it has identified six nodes. A Defence Planning Committee has also been formed. The UP Government plans to set up a defence manufacturing corridor along with the proposed Bundelkhand Expressway in order to make India self-reliant in terms of defence production. DefExpo-2020 played a key role of a catalyst in attracting not

only investments but also cutting-edge technologies to the region. The second defence corridor is the southern state of Tamil Nadu.

Memorandum of Understanding

Among the Memorandums of Understanding (MoU) signed, 23 of them were by the UP Government. Chief Minister of Uttar Pradesh, Yogi Adityanath said that these MoUs envisaged an investment of Rs 50,000 crores in the defence corridor setup in the state and generate around

in order to further the defence ecosystem in the region. Moreover, patents held by DRDO were given free to Indian companies to further develop technologies that would assist Indian companies.

Mr. Reddy said that the recent success of DRDO products, such as the Anti-Satellite Missile, a man-portable ATGM, a naval LCA, the naval torpedo VARUNASTRA, and radars, sonars and other advanced materials, have not only made India more self-reliant but also contributed to job creation and state building.

The DRDO handed over 15 licences for Transfer of Technology to 17 industries on



three lakh job opportunities. He also announced that Hindustan Aeronautics Limited (HAL) would soon supply a Dornier 19-seater civilian aircraft to UP.

Defence Research and Development

Dr. Sateesh Reddy, the Chairman of India's Defence Research and Development Organisation (DRDO) said, "It was DRDO's duty to ensure that the Defence corridor in Uttar Pradesh flourishes, hence DRDO signed a Technological partnership agreement with the state government, imparting skill training, hand holding and providing guidance in all aspects related to technology." A collaboration cell has already been setup to facilitate the process, and a research and development centre would also be setup there to act as a catalyst with respect to defence development. Technology transfer was made available at no cost to companies

DRDO-developed technologies in electronics, laser technology, armaments, life sciences, materials science, combat vehicles, naval systems, aeronautics, sensors, etc. Among many others, the products are Mine Field Marking Equipment MK-II, the Bi-Modular Charge System, an electronic fuse for 81mm mortar bombs, a Post-Impact Delay Fuse for Air Delivery Bombs, a vehicle-mounted ECM System, and high-power Li-ion Battery Technology. These high-tech products will boost the defence sector and enhance the capabilities of India's armed forces.

Indian Companies at DefExpo

At DefExpo, the Initial Operational Clearance certificate was awarded to HAL for its Light Utility Helicopter, which will replace the CHEETAH and CHETAK helicopters currently operated by the Indian armed forces. The Ordnance Factory Board launched the SHARANG 155mm artillery gun with

Author

Suman Sharma is a Delhi-based journalist covering foreign policy and defence. Before that, she was an instructor in the Indian Military Academy.

a 36 km range, the JVPC Alpha gun with 100 metres range, and a Light Machine Gun with an effective range of 800 metres.

The company Bharat Dynamics Limited presented its new AMOGHA-3 guided man-portable fire-and-forget anti-tank missile and VARUNASTRA anti-submarine torpedo.

HAL and the Kanpur Institute of Technology entered into an agreement to

develop and integrate power generation, storage, control and distribution technologies to surface and underwater naval platforms for the Indian Navy.

Russia

The 5th Indian-Russian Military Industrial Conference was co-chaired by the Indian Defence Secretary Dr. Ajay Kumar and the Russian Deputy Minister for In-

Israel

At DefExpo, several Israeli companies also signed agreements with Indian companies. For example, Israel Aerospace Industries (IAI) signed an agreement with HAL and Dynamatic Technologies Ltd. for marketing, manufacturing and selling of IAI's UAVs to the Indian armed forces and armed police forces. Elbit Systems and HAL signed a contract



Photo/Graphic: DefExpo

The Defexpo 2020 opened with an air show of the Indian Air Force's aerobatics team.

provide logistic support to the Do-228 or HS 748 aircraft as part of the institute's projects in 'Cloud Seeding'.

The DRDO signed an MoU with the companies HAL and New Space Research and Technologies Private Limited to jointly develop unmanned products, swarm technology and space systems. HAL and the Indian Coast Guard agreed on a midlife upgrade for 17 Coast Guard Do-228 aircraft manufactured by HAL Kanpur.

US Contracts

At the Indo-US 2 + 2 Dialogue in 2019 in Washington DC, Indian Defence Minister Rajnath Singh signed several key agreements and said that "the Indo-US relationship will move from a traditional 'Buyer-Seller' approach towards a collaboration approach". He also said he appreciated the improving trade relationship between both countries. When it comes to contracts signed at DefExpo with US-based companies, Lockheed Martin and Bharat Electronics Limited signed an agreement to explore industrial opportunities in the F-21 programme, and Bharat Forge Limited and General Atomics signed an MoU to

provide logistic support to the Do-228 or HS 748 aircraft as part of the institute's projects in 'Cloud Seeding'.

At the conference, a total of 14 MoUs were signed between Russian OEMs and Indian companies. In his opening remarks, Dr. Ajay Kumar said that he had signed, on 4 September 2019, the Inter-Governmental Agreement (IGA) on joint manufacturing of spares in India. The IGA provides a framework for partnerships of Russian OEMs with Indian companies for manufacturing spare parts of Russian origin equipment in use by the Indian Defence Forces. The Russian Deputy Minister, Mr. Oleg Ryazantsev highlighted that the Russian side would actively contribute to the IGA and would take steps to facilitate manufacturing of parts in India. Furthermore, the Pune-based High Energy Materials Research Laboratory signed a technology development contract with Rosoboronexport, Russia for the development of Advanced Pyrotechnic Ignition Systems.

JSC Rosoboronexport and HAL agreed on exporting spares and services to friendly countries and, in this matter, Rosoboronexport awarded a licence to HAL. The spares are for Su-30 MKI, AL 31 FP engine, RD33 engines, and accessories.

for conducting a feasibility study on the joint development of a Vertical Take-Off and Landing rotary UAV of the 2000 kg class for both maritime and land-based military operations, and HAL and Elbit Systems agreed on promoting and marketing Digital Head-Up Displays to the Indian defence services and other potential customers.

Outlook

India has liberalised its Foreign Direct Investment cap to 49% through the direct route, and above that up to 100% through the government route. The procedures for industrial licencing, defence procurement and defence acquisition have been simplified. Also, a single window clearance system was also introduced to reduce the time needed for obtaining permission when setting up of defence manufacturing units in India.

At Defexpo, Indian Defence Minister Singh said that technologies such as Artificial Intelligence (AI), Augmented Virtual Reality, Autonomous Systems, Internet of Military Things and Industry 4.0 are government priorities. ■

ESSOR Porting into Bittium's Tough SDR Radios

(df) Bittium has received a purchase order from the Finnish Defence Forces to continue porting the European ESSOR (European Secure Software-defined Radio) programme's OC1 (Operational Capability 1) wideband waveform to Bittium's Tough SDR radios. These radios will be delivered to the Finnish Defence Forces. With the current purchase order, the porting will proceed from design phase to implementation phase. The porting of the waveform to the national software-defined radios enables compatibility between radios used in European coalition operations, in accordance with the goals of the ESSOR programme.



Photo: Bittium

The first phase of the programme was successfully completed in 2015. In addition to the European High Data Rate Waveform, the first phase of the programme produced and validated the definition for the European Software Defined Radio Architecture which was ported and qualified on six different European platforms. Since 2017, the programme has continued with the ESSOR Operational Capability 1 (OC1) phase, which aims to enhance the operational capabilities of the ESSOR High Data Waveform (HDR WF). The aim of the ESSOR programme is to develop European Software Defined Radio technology in order to improve capabilities for cooperation in coalition operations. The programme was started in 2009 under the umbrella of the European Defence Agency (EDA) and has been sponsored by the governments of Finland, France, Italy, Poland, Spain, and Sweden. Management of the industrial consortium was awarded by OCCAR to the dedicated joint venture Alliance for ESSOR (a4ESSOR S.A.S.). Members of the industrial consortium are Bittium from Finland, Indra from Spain, Leonardo from Italy, Radmor from Poland and Thales from France. Germany will also enter the programme with Rohde & Schwarz as designated industrial representative.

Airbus CyberSecurity and Amossys to Partner

(ck) Airbus CyberSecurity and the Rennes-based SME Amossys will form a partnership which has three focus areas. The first concerns detecting vulnerabilities specific to operators of essential services (OVI), and responding to cyber security incidents. Already qualified as an Information Systems Security Auditor Provider (PASSI) and a Security Incident Detection Service Provider (PDIS) by the National Cybersecurity Agency of France, ANSSI, Airbus CyberSecurity is seeking to complete its OVI protection offering with a Security Incident Response Service Provider (PRIS) offer, for which the certification process is underway. Amossys, which is also a certified PASSI and is taking steps to obtain PRIS accreditation, brings to Airbus CyberSecurity its expertise in incident response through its Computer Emergency Response Team (CERT). This team stands out for its expanded service offering, particularly in detecting system compromises, namely past or current attacks on an information system. The second focus area relates to studies in artificial intelligence (AI). Teams of AI architects and researchers from the two companies will develop artificial intelligence models capable of analysing behaviour, predicting security events, simulating the adversary, and assessing information systems with embedded AI. Given the importance of education and training in cyber security, the third aspect of this partnership focuses on developing Airbus's CyberRange platform, which is used by engineering schools and continuing education institutes. The aim is to enhance the capabilities of CyberRange by integrating Amossys software modules simulating cyber-attacks.

New Head of Sales at CZ



Photo: ESD archive

Sales – Western Europe. This regional team includes military/law enforcement and civil markets in most Western European countries. Franz, who was born in Germany, studied in Madrid and Barcelona. He served in German Army Airborne and took part in missions with German Armed Forces in the

Balkans and Afghanistan. He has worked in a number of European defence companies and has more than 15 years of experience in the defence industry.

New President at Hartzell Propeller



Photo: Hartzell Propeller

(ck) Hartzell Propeller has promoted JJ Frigge to President, effective immediately. He assumes the role previously held by Joe Brown, who will become company Chairman, partnering with

Frigge on the longer-term elements of running the family owned business. Hartzell Propeller is a designer of aircraft propellers, using the "blended airfoil" technology. In 2019, Frigge was promoted to EVP and General Manager. As President, he will be responsible for all operating elements of the business including development and execution of Hartzell Propeller's strategy. Frigge began at Hartzell in 2011 as the company's controller. Since then he has steadily assumed more responsibilities in leading the company. In 2013, he took responsibility for the day-to-day business team at Hartzell Propeller in addition to marketing and brand building efforts. Prior to Hartzell Propeller, he spent 10 years as a finance manager at Proctor & Gamble. Frigge is a 2001 cum laude graduate of Notre Dame with a bachelor's degree in Business Administration, Finance and Economics.

Israel's IAI to Cooperate with India's HAL

(ck) Israel Aerospace Industries (IAI) has signed a Memorandum of Understanding (MoU) with a focus on UAVs with India's Hindustan Aeronautics Limited (HAL) and Dynamic Technologies Limited (DTL). The MoU aims to promote the production of Indian UAVs, in line with the Indian Government's



Photo: IAI

"Make in India" policy. This partnership with the Indian corporations will allow solutions for local customers based on their specific technologies and needs. IAI has also established an MRO dedicated to UAVs to provide the customers with maintenance. IAI is the exclusive UAV supplier for India's military. The company provides services to over 50 customers worldwide, with over 1.8 million flight hours. IAI's collaboration with India will centre on sharing unique technologies for upgrading UAV capabilities, offering the Indian customers advanced systems that comprise local technologies.

Indra to Open Europe's Biggest Radar Factory

(ck) Spanish technology company Indra is opening a new factory where equipment for both civil and military use will be produced. The new factory, located in San Fernando de Henares, will concentrate the company's entire radar manufacturing for civil and military use. Indra has been awarded all of the 3D radar tenders by NATO since 2005, and has supplied 40 units in different configurations world-wide: long-range, fixed or non-fixed, medium-range, high-mobility tactical



Photo: Indra

configuration and naval radars. The order book is extensive. Indra radars have advanced digital signal processing technologies (Digital Beam Forming) and add improvements to enhance their operational flexibility and reliability throughout their life cycle. Indra has concentrated the manufacturing of all its radar systems within a single 7,000-square-metre factory. At the new Indra radar production facility 200 professionals are working to cover the entire radar manufacturing cycle, from the production of the electronic cards to the actual assembly. Most of these radars will be exported to countries all over the world. The new facility will allow Indra to absorb the sales growth anticipated for the coming years.

Patria 6x6 for Finland and Latvia

(ck) Finland and Latvia have agreed on a joint development programme for sustained army mobility enhancement to which Patria is to deliver a 6x6 vehicle chassis platform. This joint programme aims to develop a



Photo: Patria

common armoured wheeled vehicle system. The programme is also open to other countries. If the development leads to actual vehicle system procurements in the future, the common system will enhance the mobility, cost-efficiency, interoperability and security of supply of the armies in both countries. The Patria 6x6 vehicle combines excellent terrain mobility, ease of use, long life-span and easy maintenance. The Patria 6x6 is sim-

SeaAirSpace 2020

The Navy League's
Global Maritime Exposition

April 6-8, 2020

Gaylord National Convention Center
National Harbor, Maryland

JOIN US at the premier maritime event in the United States.

Make plans to join the Navy League's Sea-Air-Space 2020 show along with thousands of other senior leaders from the U.S. Navy, U.S. Marine Corps, U.S. Coast Guard and Maritime Administration. With over 15,000 attendees, 337 exhibitors, 57 international delegations and 186 flag officers in attendance, Sea-Air-Space is your destination for doing business with the global naval and maritime community!

REGISTER NOW | seairspace.org

NEW SOCIAL EVENT AT SEA-AIR-SPACE

Tee Off AT TOPGOLF

ENJOY BIRDIES, BEER AND MORE!

APRIL 5, 2020 | 5 P.M. - 7 P.M.
TOPGOLF OXON HILL

Get into the swing of things at this year's Sea-Air-Space corporate kickoff event. This new networking opportunity gives exhibitors, sponsors, international visitors and other industry attendees a chance to meet and greet each other before the big show begins.

No golf experience required — enjoy three relaxing hours of open bar and food, plus a free shuttle to and from the Gaylord Resort and Convention Center.

Get your tickets now!

seairspace.org/tee-off

Topgolf is in no way affiliated, nor does it endorse, this event.

plified, reliable, has an efficient power unit and the independent suspension familiar from the Patria AMV vehicle. As a result of the spacious cabin and well-defined functions it is easy to drive and user training is simple. Reliability is secured by many commercial components which make the vehicle extremely cost-efficient.

Matthew Richi Appointed to SCD.USA Board of Directors



Photo: SCD

(ck) SCD.USA has appointed Matthew Richi to its Board of Directors. A seasoned executive with over 30 years of experience in the electro-optics industry, Mr Richi has held many key positions,

including as President of KEO, President of Maritime Sensor Systems at L3, President of L3 Wescam, and L3 Sector President of Tactical Mission Systems. The appointment took effect as of 1 January 2020. SCD.USA Infrared is a US-based designer of infrared detectors and IR modules.

Polish Naval Helicopter Programme

(mj) Poland's Armaments Inspectorate, acting for the MoD, has shared a list of nine companies (Polish and international) which are keen to participate in the technical dialogue preceding an anticipated Polish Navy helicopter tender, called the "Kondor" programme, to replace the currently operated Kaman SH-2G SUPER SEASPRITES. Poland procured four SH-2Gs that came with two OLIVER HAZARD PERRY frigates acquired in 2002-2003 from existing US Navy stock. Today only one or two of the SUPER SEASPRITES are operational, which just does not suffice in an era of renewed Russian aggression in the Baltic. Looking at the list of nine companies, there are no surprises here – especially if you visited any MSPO during the past five or six years: Airbus Helicopters, Bell Flight, Elbit, Enamor, GDMS Canada, Leonardo's PZL-Świdnik, PGZ, PZL-Mielec, and Kaman – the incumbent. The procedure is expected to start in May and conclude in July. Under Kondor the Polish Navy will procure between four and eight new naval helicopters fitting within these initial parameters: a maximum take-off weight of 6.5 tonnes; fit an anti-submarine warfare and combat



Photo: via author

search-and-rescue configuration; meet modern combat requirements; provide sufficient protection to their crews; have adequate MRO support. Kondor helicopters will serve the Polish Navy's Aviation Brigade and operate from existing and future ships, such as the MIECZNIK class coastal defence vessels, which the MoD intends to procure. In 2019 the Polish MoD bought four AW101 MERLIN helicopters worth €389 million from Leonardo for its navy. These helicopters are similar to Kondor in that they are configured for ASW and CSAR operations. However, they will operate from inland bases for the Naval Aviation Brigade.

Preview

• Country Focus: France

- Critical Raw Materials
- CBRN: Protecting the Population
- Airborne Special Mission Resources
- Mine Countermeasure Vessels
- European Submarine Requirements
- Future Tactical UAS
- Counter-UAS Systems
- Autonomous Weapons & Machine Learning
- Bridging Options
- 105 v 155mm Ammunition
- Rocket v Missile Artillery
- Medium Helicopters for Combat / Logistics
- Austrian Defence Industry

ESD 4/2020 · April 2020

Deadline: 27 March



**MITTLER
REPORT**

Mittler Report Verlag GmbH

Baunscheidtstr. 11 · 53113 Bonn, Germany
Phone: +49 228 35008 70 · info@mittler-report.de
www.mittler-report.de · www.euro-sd.com



برزان القابضة
BARZAN HOLDINGS

Transforming Tomorrow

We are transforming Qatar's defense and security sector.
Our open approach to global collaborations with leading international companies and organizations allows us to create an innovative defense and security culture, and to make us ready for tomorrow.

Visit us and our partners in Dimdex 2020, at the Barzan Holdings pavilion.

barzanholdings.com

تعزيز الإستقرار
EMPOWERING STABILITY

Partnering with European industry to create security and prosperity.



Innovation can't happen without collaboration. Understanding the problems you face, comes first. You talk. We listen. That's how we approach each project and work with customers to build the technology and capabilities they need for every challenge they face. We don't offer a one-size-fits-all approach. We offer partnership.

Learn more at lockheedmartin.com.

Lockheed Martin. Your Mission is Ours.®

